THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCIII. No. 2232.] LONDON, FEBRUARY 20, 1906. [58TH YEAR. PRICE 6d.

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OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

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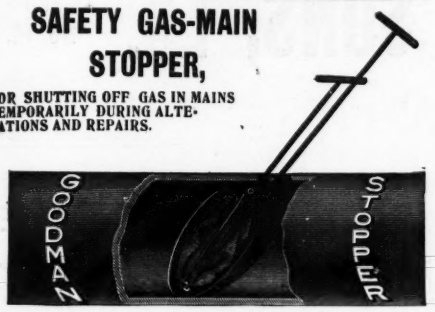
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.



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FOR GROUND USE. FLUSH BOXES ETC.

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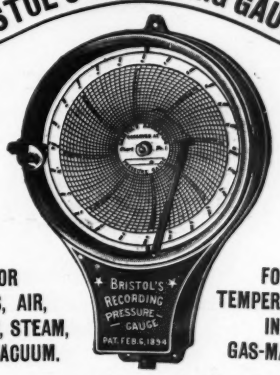

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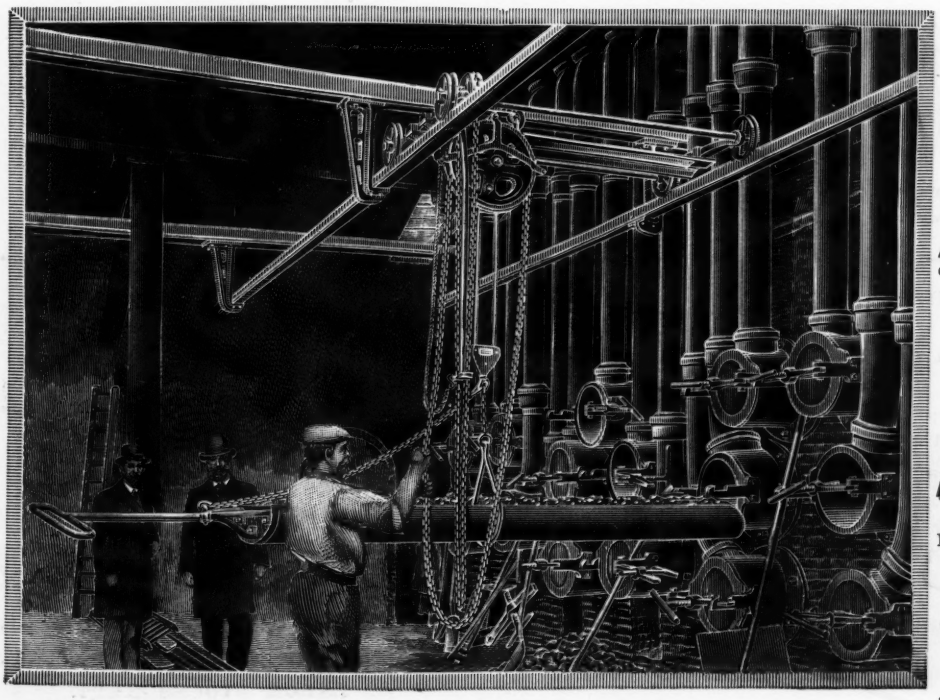

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Annual Yield per Retort increased many thousands of feet.

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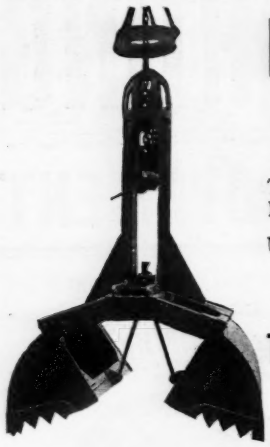

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APPLICABLE TO ANY ORDINARY SINGLE CHAIN CRANE.

These Grabs are unequalled for handling Coal, Coke, Ballast, Sand, Macadam, Ores, &c. effecting in all cases very substantial savings.

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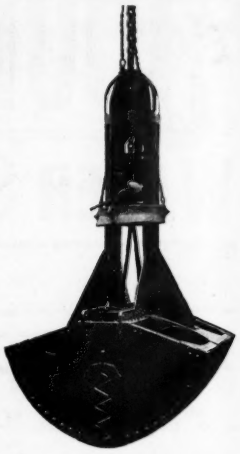

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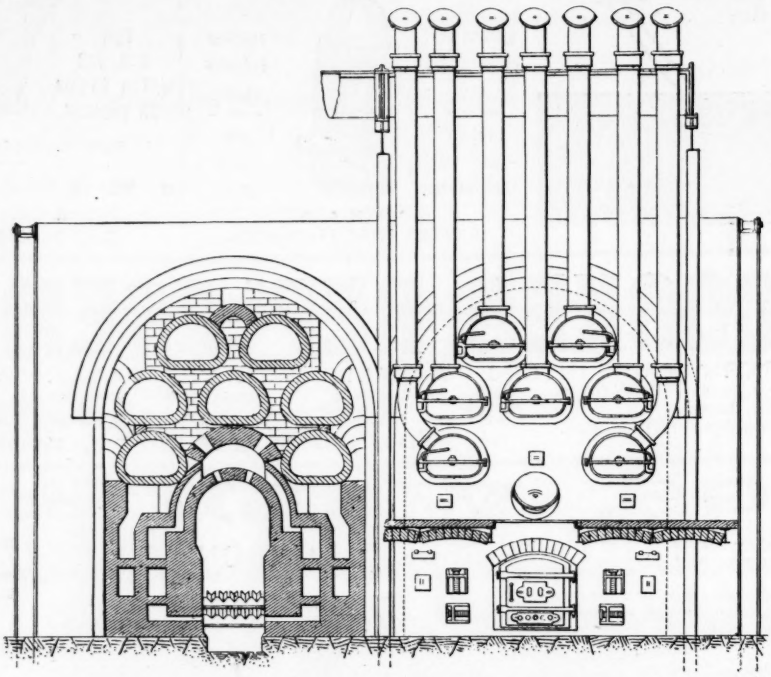

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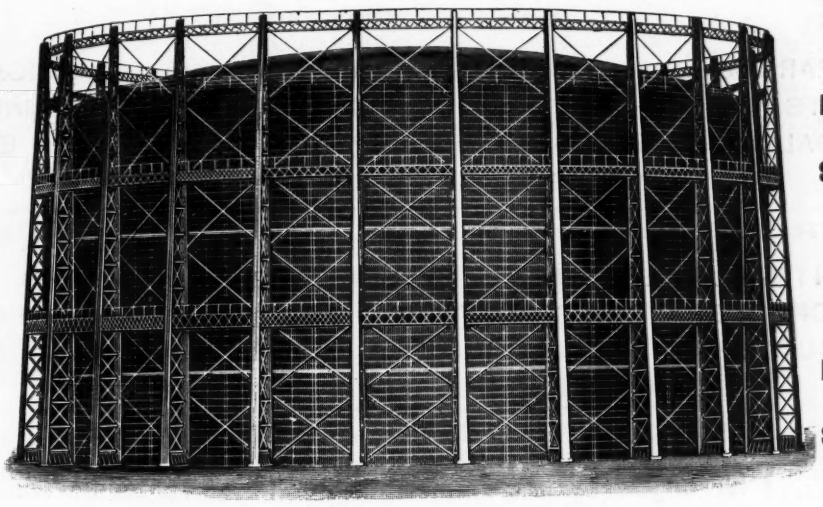

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Fitted with Detachable Attachments.

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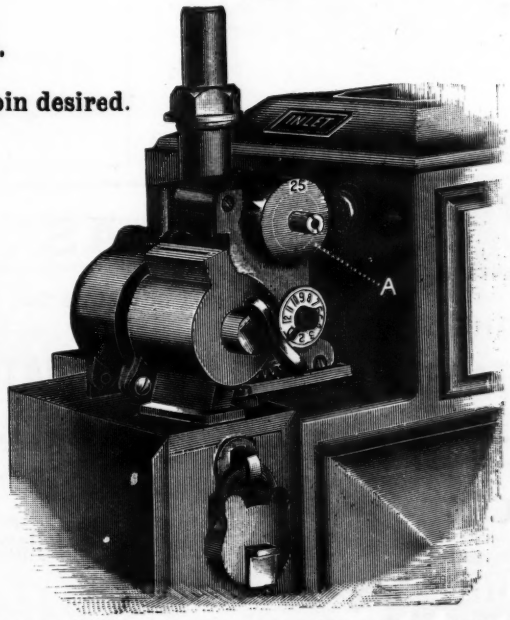

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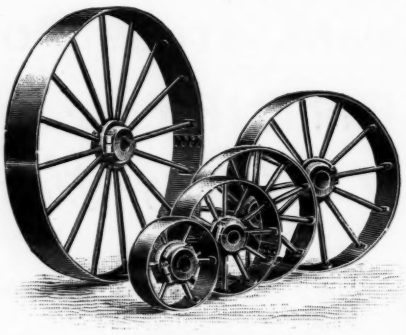

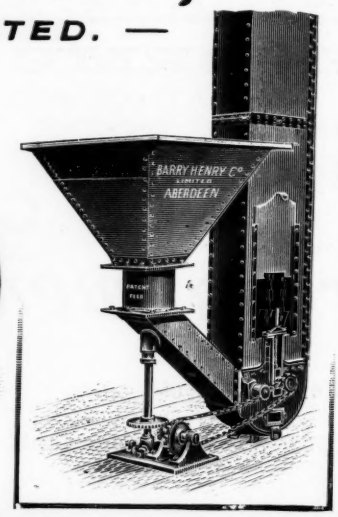

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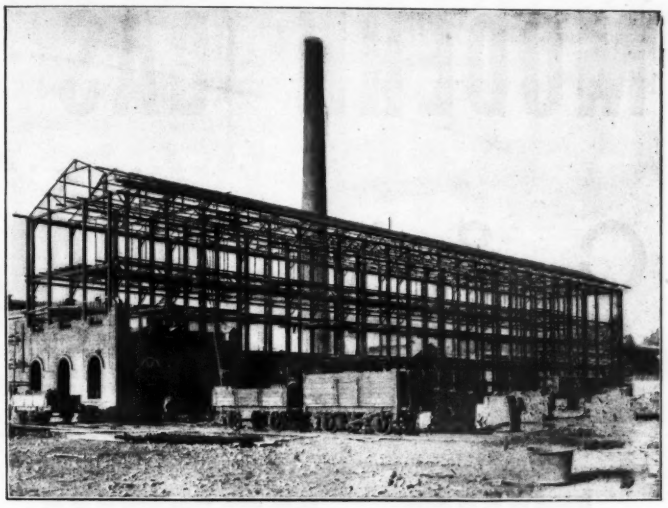

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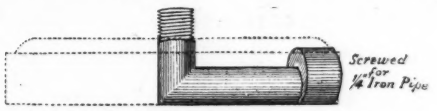

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to be made entirely on the "Island," and equal to any other on sale (imported or otherwise).

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RADIATE MORE HEAT

BY USING

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SILCO BRICKS prevent all settling of setting.

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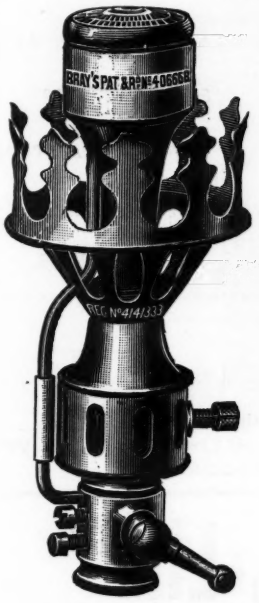

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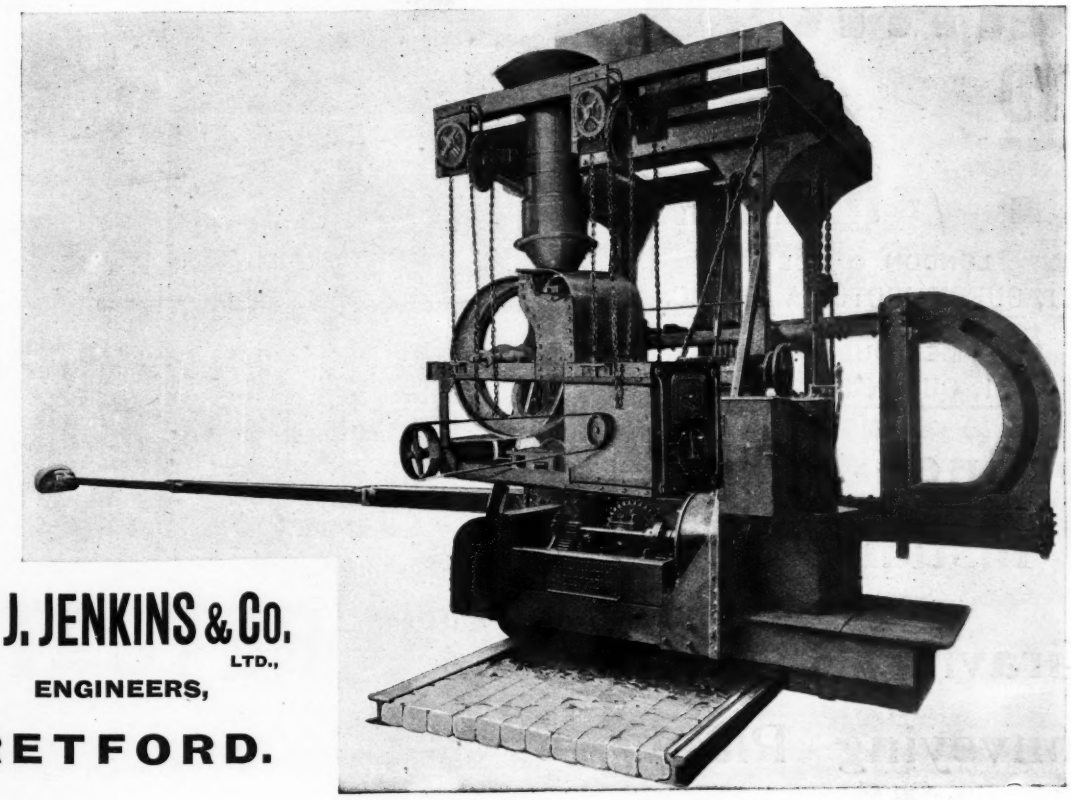
Both Discharging and Charging Operations performed by one machine, for Retorts 20 feet through.



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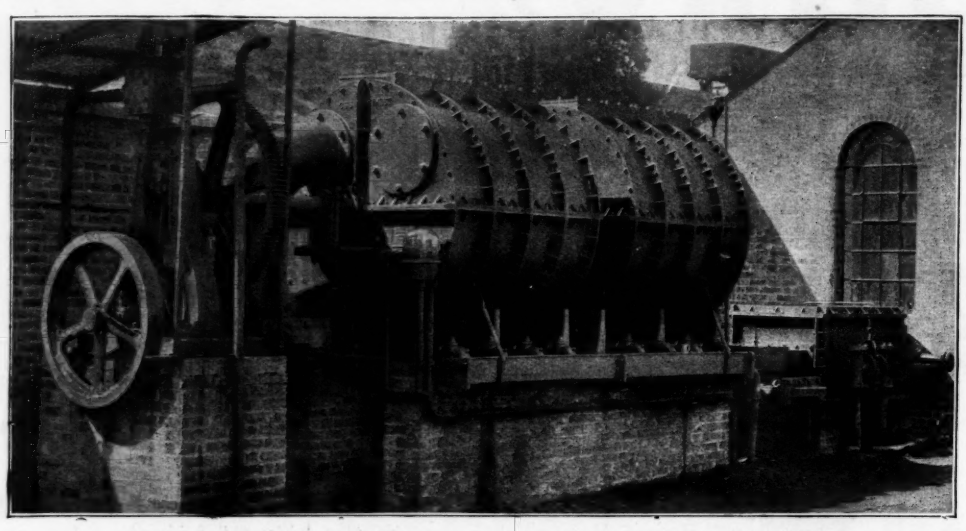

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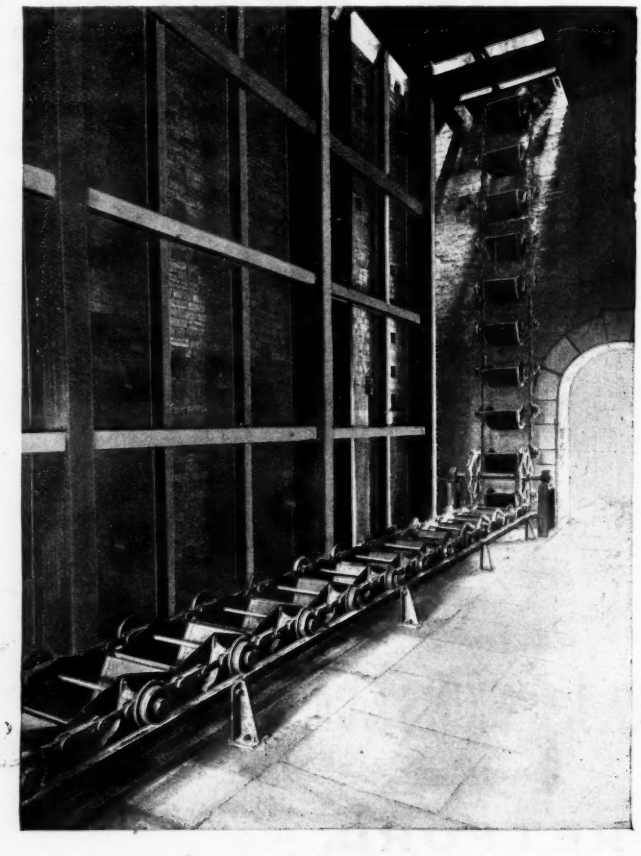

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The best way to ensure a plentiful supply *all over the house* is to instal a Wright's

AUTOMATIC

High-Pressure BOILER.

Can be fitted instead of a Range Boiler, or in conjunction with it.

GOOD Fire in the Range—the Valve on the Automatic Boiler cuts off the Gas and saves waste.

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NO Fire in the Range—the Automatic Boiler heats the water properly without it.

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Aarhus, Denmark	800,000	G. L. & C. Co., Beckton	2,250,000	Redhill	275,000
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Aylesbury	150,000	G. L. & C. Co., Bromley	3,750,000	Reichenberg, Bohemia	200,000
Barrow	300,000	G. L. & C. Co., Fulham	1,750,000	Romford	300,000
Bath	1,000,000	G. L. & C. Co., Nine Elms	2,750,000	Rotterdam, Holland	850,000
Belfast	1,700,000	Geneva, Switz.	500,000	Rotterdam, Holland (Second)	1,500,000
Belfast (Second)	4,500,000	Gosport	200,000	Rotterdam, Holland (Third)	750,000
Birmingham	1,500,000	Göteborg, Sweden	300,000	St. Gallen, Switz.	225,000
Bordentown, N.J.	125,000	Guildford	350,000	St. Joseph, Mo.	750,000
Bournemouth	1,000,000	Hamburg, Germany	1,750,000	Santiago de Cuba	400,000
Bremen, Germany	550,000	Hartlepool	750,000	Scarborough	800,000
Bremen, Germany (Second)	950,000	Hebden Bridge	200,000	Shanghai	225,000
Brentford	1,200,000	Heidelberg, Germany	200,000	Shanghai (Second)	225,000
Bridlington	150,000	Holyoke, Mass.	600,000	Southampton	800,000
Bridlington (Second)	200,000	Hull	1,500,000	Southampton (Second)	500,000
Brighton	1,750,000	L. & N.W. Rly., Crewe	700,000	Southgate	400,000
Brighton (Second)	1,850,000	Lawrence, Mass.	400,000	Southport	750,000
Brussels—Forest	1,000,000	Lea Bridge	350,000	Southport (Second)	900,000
Brussels—Ville	750,000	Lea Bridge (Second)	350,000	Stafford	500,000
Brussels—Ville (Second)	750,000	Liége, Belgium	1,000,000	Staines	600,000
Brussels—Ville (Third)	1,500,000	Lincoln	500,000	Stockport	600,000
Carlisle	600,000	Liverpool	3,500,000	Stockport (Second)	600,000
Chorley	300,000	Liverpool (Second)	4,500,000	Stockton-on-Tees	500,000
Commercial Gas Co.	850,000	Longton	600,000	Swansea	750,000
Commercial (Second)	850,000	Magdeburg, Germany	1,400,000	Swansea (Second)	1,000,000
Commercial (Third)	1,250,000	Maidenhead	225,000	Sydney—Harbour	500,000
Commercial (Fourth)	2,000,000	Maidenhead (Second)	225,000	Sydney—Harbour (Second)	500,000
Copenhagen	700,000	Malta	400,000	Sydney—Mortlake	500,000
Copenhagen (Second)	2,500,000	Manchester	3,500,000	Sydney—Mortlake (Second)	500,000
Coventry	600,000	Manchester (Second)	3,500,000	Syracuse, N.Y.	850,000
Coventry (Second)	600,000	McKeesport, Pa.	500,000	Taunton	225,000
Croydon	1,250,000	Merthyr Tydfil	300,000	The Hague, Holland	1,000,000
Croydon (Second)	625,000	Middlesbrough	1,250,000	Tilburg, Holland	400,000
Croydon (Third)	625,000	Newburgh, N.Y.	350,000	Tottenham	750,000
Deventer, Holland	150,000	Newburgh (Second)	250,000	Tottenham (Second)	750,000
Deventer, Holland (Second)	200,000	New York	1,200,000	Tottenham (Third)	350,000
Dorking	150,000	New York	4,000,000	Tottenham (Fourth)	1,000,000
Dublin	2,000,000	North Middlesex	150,000	Tunbridge Wells	1,000,000
Dublin (Second)	2,000,000	North Middlesex (Second)	200,000	Utrecht, Holland	1,000,000
Dunedin, N.Z.	150,000	Norwich	1,000,000	Utrecht, Holland (Second)	1,000,000
Dunedin, N.Z. (Second)	275,000	Ostend, Belgium	100,000	Waltham	400,000
Durham	200,000	Perth, W.A.	125,000	Wandsworth & Putney	1,800,000
Eastbourne	1,250,000	Port Elizabeth, S.A.	400,000	Watford	300,000
Edinburgh	2,000,000	Portsmouth	1,000,000	Watford (Second)	350,000
Epsom	225,000	Posen, Germany	450,000	West Ham	1,500,000
Falmouth	150,000	Posen, Germany (Second)	700,000	Winchester	225,000
Faversham	200,000	Preston	1,400,000	Zwolle, Holland	200,000

AND WORK UNDERTAKEN SINCE JANUARY 1, 1904.

Taunton (2nd)	350,000	West Ham (2nd)	800,000	Alkmaar, Holland	400,000
Bognor	100,000	Brieg, Silesia	100,000	Leiden, Holland	500,000
Bournemouth (2nd)	500,000	Brussels—Ville (4th)	350,000	Poole	1,500,000
Vienna	3,500,000	Innsbruck, Austria	200,000	Berlin-Rixdorf	650,000
Maastricht, Holland	200,000	Marlborough	100,000	Berlin-Charlottenburg	2,500,000
Antwerp, Belgium (2nd)	1,000,000	Flensburg, Sleswig	300,000	Bochum, Westphalia	530,000
Tottenham (5th)	1,000,000	Weston-super-Mare	300,000	Brussels–Anderlecht	350,000
The Hague, Holland (2nd)	500,000	Wexford, Ireland	100,000	Leigh, Lancs.	350,000
Hampton Court.	500,000	Budapest, Hungary	50,000	Stockport (3rd)	400,000
Lea Bridge (3rd)	400,000	Swindon	300,000	Agram, Croatia.	200,000
Dublin (3rd).	650,000	Reading	1,000,000	Bruges, Belgium	200,000
North Middlesex (3rd)	75,000	Oberhausen, Germany	175,000	Liége, Belgium (2nd)	750,000
St. Gallen, Switz. (2nd)	225,000	Malmo, Sweden	350,000	Lemberg, Galicia	260,000
Brussels—St. Josse	1,000,000	Ipswich	750,000	Leeuwarden, Holland	400,000
Dundee	1,500,000	Winchester (2nd)	125,000	Stockholm	1,500,000
Bridgwater	200,000	Zwolle, Holland (2nd)	200,000	Romford (2nd)	350,000

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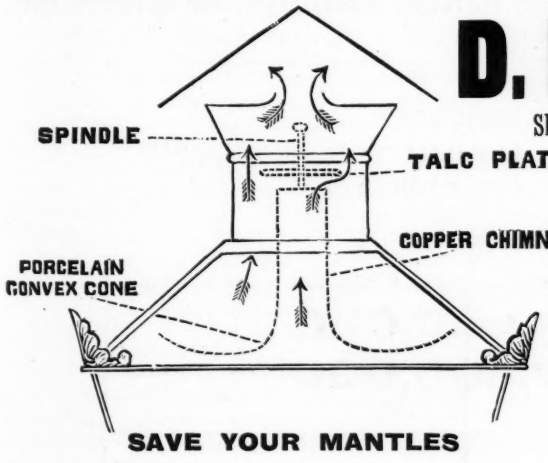

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EDITORIAL NOTES—GAS, &c.

Photometric Standards.

ELECTRICIANS do not appear disposed to accept as satisfactory for general purposes the standards of light to which the gas industry has been hitherto and are now working. The subject is one which received the distinction of several references in a paper Mr. Leon Gaster recently read at the Society of Arts, and to some of the points of which attention is drawn in our "Electric Lighting Memoranda" to-day. Mr. Gaster complains, as regards the standard candle, that there is no "legal" meaning attached to it, and that it has long been discarded as impracticable and unreliable. With the unreliability, most of our readers will be in distinct accord with him; but as to there being no "legal" meaning attached to the candle, we are not quite clear as to what Mr. Gaster intends to convey by this—inasmuch as, in the Metropolis Gas Act of 1860, the standard of light was defined as "sperm candles of six in the pound, each burning "120 grains per hour," and in one of the schedules to the Gas-Works' Clauses Act, 1871, there is a description of how the candles are to be used. We avouch both the unsatisfactory character of the candle as a primary standard, and the lax manner of definition, but still there is not altogether that absence of "legal meaning" that Mr. Gaster seems to suppose. Then, again, Dr. R. T. Glazebrook, the Director of the National Physical Laboratory, during the discussion on the paper, announced that the 10-candle pentane lamp is not one which he himself would recommend as a standard for ordinary use in a lamp factory or in a testing-station, though he admitted that, for use in a laboratory, with proper restrictions and care, it is a most admirable standard. It is well-known that to both these views, the learned doctor could find many subscribers among photometrists of long experience. But at the same time, the 10-candle pentane lamp is the most perfect of the known standards; and as Dr. Glazebrook says, used carefully, it is an admirable one. That it requires proper restrictions and care, cannot be regarded as altogether a reproach; as photometry, to be of any real use, must be conducted on, and environed by, exact conditions.

There seems, however, to be some endeavour in progress at the National Physical Laboratory to establish, "on a "satisfactory basis," some means of readily and rapidly comparing the secondary standards that manufacturers and public testing-stations are to be advised to use, provided a certain standard specification is agreed to. This scheme, shorn of its assumed benevolence, appears to be a device for giving work to the National Physical Laboratory in the calibration of secondary standards for the use of manufacturers and testing-stations. There is danger in this, if we are to have exact photometry and dependable nominal descriptions of the lamps with which electric lamp manufacturers supply the public. For any removal of the secondary standards from the immediate surveillance, through a competent photometrist such as every reputable lamp manufacturer should be able to engage, of the fundamental 10-candle pentane lamp would not give the degree of confidence that is desirable; and we fear that there would still be the disordered value-nomenclature that is found to-day between the electric lamps of different manufacturers and even of the same manufacturer. If electricians desire photometry, let there be exactness and reliability, and not satisfaction with any substitution for the real thing, unless that which is substituted can be immediately and frequently compared with the recognized primary standard.

A much more useful and legitimate work for the National Physical Laboratory is that which they are engaged upon in making a considerable series of comparisons between the British pentane standard, the Hefner standard, and the carcel lamp. When the results are published (which it is expected will be shortly), it is promised that we shall know, with a greater approach to accuracy than is the case at present, the value of the German and the French lamps as expressed in British units. It is also interesting to learn that the National Physical Laboratory has been co-operating with the authorities in America in order to secure uniformity of standard between that country and England. This is work which rightly comes within the province of the National Physical Laboratory; but to interpose secondary standards in the science of photometry in the manner proposed—a business in the calibration of which secondary standards the staff of the Laboratory desires to set up—will only cause complication. At the present time, we do enjoy the confidence of knowing that the nominal rating of electric lamps is indefinite, and that no one will feel hurt if they are treated as such. The introduction of secondary standards, however, although bearing the hall-mark of the Bushey Laboratory, if they are not subject to constant ratification, will displace the confidence referred to by uncertainty. For rating and comparing lamps, and for scientific research, let us have photometry—something that is general, and something that is capable of strict comparison and repetition—and not something that is counterfeit.

South Metropolitan Meeting—Thorium and Coal.

IF, as has been said, "the proper study of mankind is man," no excuse need be offered for the suggestion that the student of men may often find much to interest him in a gas shareholders' meeting, commonplace though it be. For there are many types of such shareholders; and of these, the one which most predominates at the meetings of the above Company is that which, for want of more correct, though scarcely more intelligible, designation, may be termed the "popular." Meeting after meeting is seen to be filled—sometimes almost to excess—with eager listeners (among them many ladies), who have come to hear the gospel of gas preached as it has rarely, if ever, been preached before. They never go empty away, but always hear something of more permanent interest than that which relates to the immediate purpose of the meeting, concerning the great industry with which they are all individually connected, by however insignificant a tie. The meeting last Wednesday was no exception in this respect.

Sir George Livesey fittingly commenced with a sympathetic reference to the loss sustained by the Gaslight and Coke Company in the death of their Governor, Sir William T. Makins; and it must have been a great satisfaction to this keen critic of that Company's proceedings in times past to be able to say his relations with the late Governor had latterly been of the most cordial character. He had the further gratification of being able to attribute much of the success achieved last session against the London County Council to the friendly feeling now existing between the three Metropolitan Companies. The great advantage of united action was never perhaps more clearly exemplified, and will, it may be hoped, be an abiding lesson to all concerned.

Justifying a brief reference to the report, by pointing out that this indicates clearly the present position of the undertaking, Sir George, with characteristic disregard for conventional treatment, directed his audience in the first place to the final item in the accounts, showing the amount (carried to suspense) expended upon the purchase of the monazite sand property in North Carolina. This was truly described as a kind of insurance for the stability and security of the undertaking; such view being heartily endorsed by the shareholders, to the vast majority of whom the paramount importance, not to the Company alone, but to the whole gas industry, of the incandescent mantle, is no secret. For the benefit of any who, from long familiarity with the prosperity which has attended the gas industry, find it very difficult to realize the possibility of embarrassment—to say nothing of disaster—the Chairman explained the reasons for the great importance which attaches to it. The recent remarkable drop in the price of thorium need not disturb the equanimity

of the South Metropolitan Gas Company, who can very well afford to "sit tight," while in the meantime, thanks to their enterprise and foresight, buyers of mantles are enjoying the benefit of an easier market. It is not, of course, to be expected that invention and discovery will stand still indefinitely, to please the owners of monazite sand; but these will have the great satisfaction of knowing that they have at command stores of material by the use of which gas is far more than a match for any other kind of artificial lighting. Whatever the future may have in store, the probabilities are that this material will not be easily and quickly displaced.

On the subject of coal supplies, a much-needed warning was given to the coal owners to moderate their demands. When plain speaking is needed, Sir George is not the one to mince matters; and plain speaking is needed just now. On the table in front of the Chairman were placed bottles of coal as samples of what is supplied for gas making from the Newcastle coal-field. It is for such indifferent material as this was seen to be, that exorbitant prices have been asked and obtained in the past, and for which the London Companies are now threatened with a substantial advance upon last year's prices. It seems evident that the coal owners in the North are prone to presume upon their geographical position, which admits of transport by sea at cheap rates. Thus the cost of their coal is dependent, less upon its intrinsic value than upon the general question of accessibility to markets. It is surely time for the Railway Companies to bestir themselves, so as to bring the vast Midland coal-field more into touch with London buyers. A boom in the iron trade is just now the excuse for an attempt to force up prices, although this is confined to one district only. It is the bounden duty of all who are interested to resist to the utmost of their power a movement which cannot but seriously embarrass the gas industry, seeing that a supply of cheap gas suitable for fuel and motive power purposes is increasingly necessary. The demand for this cannot be met if coal is not to be obtained at a reasonable rate; and it is greatly to be desired that the hint given by Sir George to those who are about to contract for their coal supplies will be acted upon, so that the northern coal owners may be brought to realize the position. So far as may be possible, there should be combined action in this matter, and, above all, no giving way to unreasoning panic with regard to it. There is plenty of coal to be had; and if the coal owners in one district decline to be reasonable, those of another district should be tried. The purchase of coal is by far the most important that can engage the attention of a gas directorate or committee; and upon it depends the prosperity of the undertakings. Consequently, all the care that can be exercised with regard to it will be pains thoroughly well bestowed.

It was but natural and fitting that Sir George should wax indignant over the idiosyncrasies of rating surveyors; and it is greatly to be hoped that the exposure of the author of the "sporting figure" will not end with his denunciation at the meeting. A scandal such as this really is demands a stern rebuke; as does also that other scandal of different rates of values being applied to the same district and under similar conditions by the same rating surveyor. Failing the ordinary means of redress, there remains the alternative mentioned by the Chairman of raising the price of gas in those parishes in which the rating is excessive. Not much was said on the subject of gaseous fuel, or the effect of the London Gas Act, 1905, in the establishment of gas testing upon a reasonable and satisfactory footing; these matters having been already dealt with in the report. The present aspirations of the Chairman and his colleagues were, however, clearly revealed by the pregnant statement that "what "we want further is liberty to supply the gas that the consumers want;" in other words, Home Rule is desired. That "the time will come when the question of nominal "illuminating power will be a matter of no consideration at "all" is pretty generally believed; for even its utility as a rough test of the calorific value of gas is being undermined by the calorimeter. The references made to allotment of capital among the consumers and co-partnership, accounts in a great measure for what is referred to above as the popular character of these gatherings. That the practice of offering all new stock to consumers has been extraordinarily successful, is evident from the fact that since 1890 capital of the value of £1,127,000 has been purchased by 8263 consumers. The advantages rightly claimed for this system are that it makes friends, and is a means of distributing property. The real significance of the latter was explained by an apt quotation from Mazzini, the great Italian patriot and social reformer. "We must not," he said, "seek to "abolish property because at present it is the possession of "the few; we must open up the paths by which the many "may acquire it." This has the ring of the true metal, and is far enough removed from the socialistic doctrines of the present day. The very useful work which is being done by the South Metropolitan Company in this direction is apparent from the figures quoted by the Chairman, showing the large numbers of consumers who have applied for small amounts of stock; and these were supplemented by the announcement that £300,000 of stock is now held by employees under the co-partnership system. Well might the Chairman claim, on behalf of the shareholders, that, in addition to getting fair interest for their money, they are doing something to benefit the country at large.

The Gas Business in an Industrial District.

DURING the past few years, the administrators of the Metropolitan Gas Supply have had such large inroads made on their time and attention by parliamentary proceedings, a long departmental inquiry, and negotiations with not overamicable authorities, that their attention must have been somewhat diverted from the ordinary domestic affairs of their huge concerns. But we believe and hope that, with the settlement of the current assessment questions, there will be a long period of comparative peace for the Boards, and that they and their officers will be able to devote themselves completely to administrative and development work. That there are still large opportunities for development is well illustrated by the luminous speech to which Mr. W. G. Bradshaw, the Chairman, treated the proprietors of the Commercial Gas Company last Thursday. There have been occasions when we have heard the prospects of development in the Company's district referred to in almost lugubrious tones; but the past few years have shown—the last one more than others—that, in an industrial area such as that of East London, development is to be made by descent rather than by constant working at the old levels which have largely been exhausted. True the business obtained by going deeper is more costly in proportion to the old. But "small "profits and quick returns" is a business principle that has enriched many a man; and, in a measure, that principle has fitting application to the system of prepayment gas supply. By the accumulation of small profits from these "cash-down" consumers, is due a not inconsiderable measure of the solid prosperity of the Commercial Company as seen to-day. Last year, while only 363 new ordinary consumers were connected up, there were 9224 coin-meter consumers added to the Company's books—making the numbers of the respective classes of meters 25,306 and 45,224.

A branch of the Company's business which bears some analogy to that of prepayment supply is that of stoves—the resemblance being in the increased capital expenditure necessitated (relatively to the old lighting business) for the comparatively small amount of business done per stove. The stove connections made by the Company last year indicate the growth in favour of the gas-stove in a community that is essentially working-class. There were 8388 new gas-stoves fixed during the year; and of them 5041 were installed in the second half of the year. Considering the character of the population, a percentage of 55 of the consumers using gas-stoves is an excellent one. But there is the other 45 per cent.; and, in regard to the consumers represented by that figure, there was activity enveloped in the words of the Chairman when he said that the Company were "on the "track" of the 45 per cent. We shall watch, from this meeting, with sharpened interest for the reduction of that gas-stoveless percentage. In these directions are the roads to greater development; and the Company are exploiting them to their fullest extent, while not neglecting addition wherever possible to their ordinary business. When consideration is given to these figures, there can be little doubt whence came the very satisfactory increase last half year of 5½ per cent. in gas consumption, which—regarded merely as a percentage increase, and remembering the widely differing volumes of the three Companies' gas businesses—is the best Metropolitan record for the half year. And it is largely in consequence of this and of the increased rental of meters and stoves that, notwithstanding charges to revenue on account of distribution which might have been put to capital, the

Company, for the first time since they reduced their price to 2s. 5d. per 1000 cubic feet, more than earned the amount required to pay the dividend. The balance of £1234, after paying dividend, goes to enhance the financial stability of the concern, and so progressively will the various economies which have been ensured by wise administration and perseverance, in conjunction with the other Metropolitan Companies, in the wearing away of fettering stringency.

Rates in the Company's district are heavy; and there is no immediate prospect of decline. Two appeals, in fact, are at present pending against the attempted exactions of Assessment Committees. It is not sufficient that the rate-poundage should be high, but the Local Authorities seek excessive assessment as another means of swelling their revenues. Instead of encouraging the industry of the East-end district, the Borough Councils are doing their level-best to drive it away; and all the losses in this respect will make it worse for those who remain. But in respect of rates, of all industrial undertakings gas companies are in the worst position. Heavy assessments and high rates are not for them the end of grievance. They have to give up business to the municipally-run competitor; and then succour the competition by assisting to pay for an excessive form of public lighting and to contribute in other ways to the burden imposed by the deflections of the municipalities from the well-defined courses of business management. We can only hope that the experiences of the past in municipal trading in London will have the effect of preventing the extension of the so-called privileges with which an easy-going Legislature has in the past endowed local governing bodies.

Midland Association of Gas Managers' Meeting.

Attracted by the prospect of a Presidential Address from so capable an engineer as Mr. F. W. Stevenson of Coventry, and of a paper upon the gas-works extension at Wellingborough by Mr. J. T. Lewis, the fame of which had already spread, there was a very good attendance at the meeting of the Midland Association last Thursday in Birmingham. Nor did the least disappointment await the members who attended from a very wide area—embracing such distant places as Liverpool and Gloucester, Nottingham, and even Norwich. Mr. Stevenson distinctly enhanced his reputation by the delivery of a very thoughtful and painstaking address, dealing, with the hand of a master, with all the engineering problems connected with carbonizing that vex the soul of the gas manager to-day, and, in almost every line, imparting to his audience the fruits of his own considerable experience with regard to them. It but too often happens that Presidential Addresses are either listened to or read, and then forgotten; they have their little day, and are then—perhaps mercifully—cast aside. This address is, however, deserving—and will doubtless achieve—a better fate. It is one which will well repay careful study by all who are interested in the subject-matter of it, and who will find in it much that cannot fail to be of service to them.

The exceptionally strong financial position which Mr. Stevenson was instrumental in building up for the Sheffield Gas Company, he is very naturally desirous of seeing repeated at Coventry; and the best advice that can be offered to the Corporation of the town is that they should act upon his recommendation with regard to it. They cannot but be aware that a supply of cheap heating gas is becoming more and more a necessity, particularly in a manufacturing town such as Coventry. This necessity cannot possibly be met so long as the undertaking has to bear the burden of a heavy capital expenditure, to alleviate which it would only be common prudence to forego, for a time at any rate, the annual contribution made by the Gas Department to the relief of rates. Had this been done in anticipation of the necessity for building entirely new works and abandoning the old ones, how much stronger would the position of the undertaking be to-day than it is. All this is made very clear by Mr. Stevenson in his address; and we cannot but agree with him in his denunciation of the practice so frequently followed by Local Authorities, of levying upon gas consumers for the relief of rates. It is one to which we have always taken exception, as unfair in principle and pernicious to the interests of gas undertakings. We do not, however, so readily follow him in his assertion that local authorities, in connection with their gas undertakings, are less mindful of capital expenditure than companies. In so far as the management is concerned in this, there are, it may be said, as capable men in the service of local authorities as in that of companies; while as regards the allocation of expenditure to capital or revenue, it will probably be found that the tendency to relieve capital at the expense of revenue is greatest in the case of local authorities. At all events, the Board of Trade returns appear to confirm the point raised by Mr. Charles Hunt (who dealt with it in his Presidential Address to the Incorporated Institution of Gas Engineers in 1892)—namely, that the tendency to a reduction of the average capital expenditure per ton of coal carbonized, or per million cubic feet of gas sold, is greater in the case of local authorities than in that of companies. This was remarked upon in our editorial columns on March 7 last; and the figures then given may be of interest to Mr. Stevenson in this connection. Having regard to the large reduction in the capital outlay by the local authorities which these show to be taking place, it would not be at all surprising if it were the fact, as stated by Mr. Stevenson, that gas is generally supplied by companies cheaper than by local authorities. But, anyway, no proof of such a fact is to be found in the address.

It is generally "the unexpected that happens;" and, unexpectedly, for the subject is not one that lends itself to much debate, the paper by Mr. J. T. Lewis, descriptive of his recent extensions at Wellingborough, gave rise to a long, and by no means profitless, discussion. But in a redundancy of speech-making the point of a paper is apt to be somewhat lost sight of; and, interesting as were many of the experiences related by various speakers, the question really raised by Mr. Lewis, and as to which he invited criticism, was whether, having regard to all the circumstances, he had really done wisely and well or the reverse. As to this, there can hardly be two opinions. Mr. Lewis has applied machinery to nearly the whole of the carbonizing operations, from the receiving of the coal to the delivery of the coke, and with most satisfactory results. The latter, indeed, were the surprise of everybody, especially taking into account the size of the works. He is, indeed, to be congratulated upon having demonstrated the advantage of applying machinery to small works; and the results he can now show will be an incentive to others to follow in his footsteps. It is to be noted that he follows the practice advocated by Mr. West, of constant and systematic inspection of all machinery. This is clearly necessary if the inconvenience of occasional breakdowns and stoppages is to be avoided.

Several alterations of rules were approved at the meeting; one of them providing for the President and Honorary Secretary of the Midland Junior Gas Association to be *ex-officio* members of the Committee of what may be termed, in this case, the parent Association; thus carrying out the principle which underlies the affiliation of the District Associations with the Institution of Gas Engineers.

A New Gas-Works Clauses Act.

We are glad to have the necessity for a new Gas-Works' Clauses Act emphasized by Mr. V. Balfour-Browne. His presentment of the argument for amendment and extension of the Act is fraught with such interest and conclusiveness, that the article elsewhere in this issue is certain to engage the best attention of a large number of readers. But what then? It requires someone to make the first move towards securing the desired object. The convenience of the expense-and-labour-saving system of legislation by reference, where this can be done, is well illustrated by the old Gas-Works' Clauses Act and its amending Act of 35 years ago; and the subsequent changes in gas legislation illustrate, year after year, the inconvenience that is occasioned by such a prolongation of the period of revision of a General Act in the case of an industry of such progressive attributes as that of gas production and supply. There are two points in Mr. Balfour-Browne's article upon which remark may be made. The first has reference to his observations on the auction clauses. He has apparently overlooked the variation which has been made in these, in certain cases, by the permission accorded to the Companies to first offer new issues of stock to consumers and employees. The second point has reference to the sliding-scale which, he says, "is intended to secure the reduction of the price of gas by bribing the company to reduce it." There will be objection to the word "bribing." The sliding-scale is rather a statutory adjustment of benefits (produced by economies and prudent administration on the one hand, and

patronage on the other) as between supplier and supplied. Competition compels the lowest possible price; and maximum-price companies with fixed dividends furnish evidence that the "bribe" of increased dividend is not an essential to low charges for gas. It is hoped that the article will stir up sufficient interest to initiate the steps requisite to direct the attention of the "powers that be" to the long-existing want of the gas industry.

The Sulphur Clauses.

Lord Rayleigh and his fellow-members of the Departmental Committee who, *inter alia*, considered with minuteness and impartiality the question of the removal of the sulphur compounds from gas must bow their heads with great humility. Alderman Deakin, of Shrewsbury, has read, "with great care," the part of the report of the Committee on this particular subject; and he announced in the Town Council the other day that "he differs very strongly from the conclusions arrived at"—in fact, he "disagreed entirely" with the report. After all the trouble, too, to which the London County Council went in ensuring that all sides should be heard before the Committee arrived at a decision, it will come as a blow to them to find that Alderman Deakin is also under the impression that "the evidence before the Committee was interested evidence—evidence of people connected largely with gas companies." But the Alderman surpassed himself when asked to explain why Parliament had not inserted the sulphur clauses in recent Acts of Parliament. The reason given by him was that "recent Acts were promoted by municipal corporations themselves, and that was a very different thing." The fact is the other way about—municipal corporations have only promoted a small proportion of the Bills. If Alderman Deakin's disagreement with the Departmental Committee's report is founded on knowledge equal to that which he possesses of the history of gas legislation, the leaders of Science who constituted the Departmental Committee may again raise their heads. There is one other statement which both gas-supplying local authorities and gas companies will read with the same delight that they would look upon a caricature by the late lamented Phil May. Here it is: "The corporations supplying gas were themselves the guardians of the public safety; and it was not necessary to include the clauses in their Acts; but when private companies were supplying gas . . . then the local authority must, in the interests of the ratepayers, have protective clauses." The statement needs no comment. The Council have decided to oppose the Gas Companies' (Removal of Sulphur Restrictions) Bill. On the other hand, the Derby Corporation have accepted the abolition of the sulphur clauses. Meantime, the promoting Companies are going on with confidence in the strength of their case. In London, the removal of the clauses has had effect since the end of last September; and at the meeting of the Commercial Gas Company on Thursday, the Chairman (Mr. R. G. Bradshaw) said that the four-and-a-half months' experience had proved that the change had not injured the consumers in the slightest degree, while it had afforded a welcome relief to the Company's officers from a useless and unnecessary anxiety.

Rival Illuminants.

Attention may briefly be drawn here to the account which appears in to-day's issue of a debate that took place at the meeting of the Bartholomew Club in the City last Tuesday on the time-honoured subject of "Gas *v.* Electricity." The report reveals several things. One of them is that the electricians deliberately missed what was an excellent opportunity of placing before an eminently practical audience any merits which the commodity they have to dispose of may possess; and, except on the one hypothesis that there are no such merits, their attitude is certainly difficult to understand. It is true that the representative of one Company did write and give a reason for not taking part in the proceedings; but this reason, as will be seen, is so ludicrously inadequate that one cannot help thinking it would have been very much better for them to have given none at all. Mr. F. W. Goodenough, the Chief Inspector of the Gaslight and Coke Company, had promised to open the debate; and the excuse put forward by the writer of the letter in question for declining the invitation to be present, was that Mr. Goodenough preferred abuse to argument. No satisfactory evidence whatever was adduced to substantiate this charge; and Mr. Goodenough confidently left it to his audience to form their own opinion on the matter, after briefly stating the facts. What this opinion was, can be fairly gathered from the remarks of the Chairman (Mr. Carl Hentschel) that "he was sorry the official of an Electric Lighting Company should write such a letter," and of Mr. A. C. Morton, M.P., that it "was most unfortunate, though it to some extent showed the spirit in which that Company had acted with regard to the City Corporation." Apart from this incident, the absence of any official opposition must have proved a disappointment to Mr. Goodenough; for the greater the discussion, the better able would he have been to drive his points home. And this possibly is what the Electric Lighting Companies thought. However, Mr. Goodenough put forward a plain and convincing case for gas, based on calculations from tested data and on the actual experience of users; and his comparisons of cost must have appealed strongly to the business men who constituted his listeners. Street illumination by gas also, as was to be expected, found a warm supporter in Mr. Morton, whose remarks on the lighting of the City will (like Mr. Goodenough's statements) have interest for a much larger circle even than the members of the Bartholomew Club.

Inverted Burner Litigation.

At the termination of a very lengthy argument of the case, the Judges of the Court of Appeal have upheld the decision given by Mr. Justice Joyce last May, in the action brought by the New Inverted Gas-lamp Company, Limited, against the Globe Light, Limited, for infringement of patent No. 5769 of 1900, granted to Josef Bernt and Emanuel Cervenka. Mr. Justice Joyce, having heard numerous expert witnesses, came to the conclusion that there was no infringement at all of the patent by any of the lamps which the defendants had put upon the market. The patent was for the combination in a reversed bunsen burner of what was called an isolator with what was called a deflecting cone; and the learned Judge could not find in the alleged infringement (which was the ordinary bunsen burner reversed) that there was any isolator at all, nor that there was any deflecting cone put there for the purpose that plaintiffs put theirs. The result was that the action was dismissed; and this view of the matter has been concurred in on appeal. Originally one of the defences was want of novelty in the patent and prior publication. But the case was subsequently limited to the question of infringement; and the patent was not seriously attacked. Under these circumstances, Mr. Justice Joyce was not called upon to give any decision with regard to the validity of the patent; and the Judges of the Appeal Court, when applied to by Counsel for the plaintiffs to grant a certificate that the validity of the patent had come in question, declined to do so. At the end of last year Mr. Justice Buckley had the same patent before him in an action brought by the New Inverted Company against Messrs. Cope and Timmins, Limited; and the decision was then also in favour of the defendants, without going into the validity of the patent. It cannot therefore be said that the object and scope of the invention has not been fairly well threshed out in the Law Courts.

Industry and the Municipal Accounts Inquiry.

The inquiry into the methods—right and wrong—of municipal account keeping, which it has fallen to the Right Hon. John Burns to institute, is a matter that private enterprise must not neglect. The London Chamber of Commerce are taking an active lead in following up the appointment of the Departmental Committee; and they invite the co-operation of industrial associations who are interested. And what industrial association is not interested? The Chamber of Commerce are anxious that an independent audit of municipal accounts by professional accountants should be established, and that municipal accounts should be standardized. With a view to obtaining opinions from all sides on these questions, the Chamber are arranging a conference for March 5, to which they are inviting local authorities and industrial organizations. The Chamber have already protested against the composition of the Departmental Committee, urging that, if a larger number of independent auditors had been appointed to serve on it, it would have commanded to a greater degree the confidence of the commercial community. At the same time, the appointment of the Committee is welcomed as a step in the right direction; and it is hoped that the report will be issued before the close of the session, so that effect may promptly be given to the results of the Committee's deliberations.

PERSONAL.

The New Governor of the Gaslight and Coke Company.

The Court of Directors of the Gaslight and Coke Company at their meeting last Friday elected Mr. CORBET WOODALL to the Governorship, in succession to the late Sir William Makins, Bart. The appointment was practically a foregone conclusion; the only doubt being as to whether Mr. Woodall himself would be disposed to accept the appointment, which for a gas practitioner holds a greater responsibility than for a layman. It is a position, however, which a gas expert who is also a man of affairs, can best fill. Conjoined to the possession of those qualifications by Mr. Woodall, is his intimate knowledge of the administration of the affairs of this great concern from the time that he was invited to a seat at the Board in August, 1897. We congratulate him upon his elevation by his colleagues to the distinguished position, adding the hope that, in occupying it, the burdens which are bound to fall upon the head of such an undertaking will be lightened by the pleasures of resulting successes from duty discharged, as it will be, with fealty to proprietors and consumers alike. Of this we are confident, that there is not an officer in the undertaking who will not do his utmost to support a Governor who has himself served in the official ranks of gas undertakings.

The report presented at the recent annual meeting of the Launceston Gas Company referred with regret to the retirement of Mr. J. TRELEAVEN, who has held the position of Manager since the formation of the Company, and who has been obliged to resign through ill-health. The untiring and efficient service that he has rendered to the Company was recorded with the thanks of the Directors; and it was decided that he should be presented with his portrait in oils. The Chairman (Dr. D. Thompson) said that through Mr. Treleaven the works had been built up to a satisfactory point of efficiency; and now the Company had a very valuable property. He had devoted a great deal of energy to the service; and the Directors felt that this was deserving of some recognition. Mr. Treleaven, in acknowledging the references to himself and the presentation of his portrait, said he regretted that it was necessary for him to retire, but he was no longer able to discharge his duties. During the 31 years he had been connected with the Company, he had endeavoured to study economy with efficiency; and the works had earned praise for being among the best of the small ones.

OBITUARY.

Mr. WILLIAM MOXON, who was for some years Chairman of the Northampton Gaslight Company, died last month, and Mr. C. E. Thorpe has been elected to his seat on the Board.

We regret to record the removal by death last Tuesday, at his residence in Antrim Mansions, South Hampstead, of Mr. HENRY JAMES CHANEY, the Superintendent of the Standards Department of the Board of Trade, who in this capacity will have been known personally to numbers of our readers. Deceased was born at Windsor in 1842, and was educated at a private school in the Royal borough. He entered the Civil Service in 1859; and the following year he was appointed to the Exchequer, to undertake the duties arising under the new Sale of Gas Act, which required that all meters should be tested and stamped. For a long time he was Secretary to the Royal Commission on Standards; and as in that capacity he showed much aptitude for the technicalities of the position, he was in 1876 appointed Superintendent of the Standards Department of the Board of Trade—a position which he occupied till the time of his death. During his tenure of the post, Mr. Chaney was a member of several Parliamentary Committees on units and standards of measurement, and represented Great Britain in Paris in 1889 at the General Conference of the International Committee on Weights and Measures. In 1891, he was British representative at the International Conference on the Metric System. He was a Fellow of the Royal Astronomical Society; and upon the institution of the Imperial Service Order in 1902 he was one of the first to be nominated a Companion, as was noticed in our columns at the time. Mr. Chaney had written various important official reports on weights and measures which have been issued under the direction of the Board of Trade; and he was the author of a work entitled "Our Weights and Measures" which was published in 1879. He also prepared a useful set of tables, suitable for the pocket, of the Imperial and metric weights and measures and their equivalents.

We learn from "The Times" that the list of officers for the 76th meeting of the British Association, which will open in York on the 1st of August next, is now practically completed. The meeting promises to be one of great interest. It was at York that the Association came into existence in 1831, when Lord Milton (afterwards Lord Fitzwilliam) was the President. Thirteen years later, the Association again met in York, with the Rev. G. Peacock as President; and for the third time in 1881, when the Association celebrated its jubilee, under the presidency of Sir John Lubbock (now Lord Avebury). The next meeting will be the fourth. The President-Elect is Professor Ray Lankester; and the Sectional Presidents and Vice-Presidents include Professor Wyndham Dunstan, Professor A. Smithells, and Mr. G. T. Beilby, who will conduct the proceedings in the Chemistry Section.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 516.)

THERE was hardly any change last week in the general position or the tendency of things on the Stock Exchange; and even at the close there was nothing in view to show a glimmer of approaching improvement. Business was very quiet—on some days it was so to an extreme degree—and dull. Anxious regards were turned towards Algeciras, which, coupled with other agencies, had a depressing effect. Though there was a momentary flicker in mid-week, it quickly died away; and then things were dull to the close. In the Money Market, the situation was at first easier, and rates for short loans and discount began to relax. But the screw was soon put on again; and they stiffened up as hard as before. Business in the Gas Market was irregular in point of activity. It opened fairly brisk. But after a while it began to quiet down; and at last, on the closing day, dealings were very few and far between. The general tendency was good, and a few quotations made some nice advances. A satisfactory feature was a recovery in Gaslight and Coke ordinary; the quotation of which improved a point. Transactions on Monday opened with a cheap lot at 98, after which the figures steadily progressed until 99½ was marked on Saturday. Similarly in the secured issues, the maximum started with a bargain at 87¼; but on Friday it changed hands at 88⅝. In the preference, there was only one special deal at 108½; and the debenture was done at prices ranging from 88¼ to 89—the quotation showing an advance of a point. South Metropolitan was fairly active on Monday, after which it became quite stagnant. Prices were close, varying only between 131½ and 131¾; and the debenture was done at 89. There was not much moving in Commercials; but it was more than recent weeks have managed to muster. The 4 per cent. was done at from 117½ to 118½; the 3½ per cent. was not done at all; and the debenture was done at 85. Why this stock should be four points cheaper than Gaslight and Coke debenture stock is one of the mysteries. The Suburban and Provincial group were, of course, quiet and, almost equally as a matter of course, strong. Brentford old advanced 2, and Brighton original 4; but neither was dealt in. Wandsworth debenture marked 84; and West Ham ordinary rose 1 in anticipation of the higher rate of dividend payable next week. On the local Exchange, Liverpool "B" had a rise. Of the Continental Companies, Imperial was less active, and it had a set-back of a couple of points. On Monday, it changed hands at 239½; but on Thursday, it was done at 236½. Union marked from 131 to 133; and ditto preference, 145 and 146½. European fully-paid was done at 22½ and 22¾, and ditto part-paid at from 16½ to 17. Among the undertakings of the remoter world, Bombay marked 7⅛, Cape Town 17 5/16 and 17⅜, and ditto mortgage 52½. Buenos Ayres was done at 12⅝ and 12¾, Monte Video at 12 7/16 and 12⅜, Primitiva ordinary at 7¼, ditto preference at 5⅜, ditto debenture at from 98¾ to 99¼, River Plate at from 13 to 13¼, and San Paulo at 51 and 51½.

The closing prices are shown in our Stock and Share List on page 516.

ELECTRIC LIGHTING MEMORANDA.

In the Cause of Improvement in Electric Glow Lamps—Voltages and Performance—Rare Metal Filament Lamps—Further Information on Flame Arc Lamps—Sir William Preece's "Poor Gas Friends."

How to get uniformity of lighting power from electric lamps has always been, and still is, one of the perplexities of electrical illumination. Not long ago, Mr. Leon Gaster, Assoc.M.Inst.E.E., in "The Times" suggested that it was through the gate to photometrical knowledge that the electric lamp manufacturer must pass to obtain uniformity in his productions; and to this may be added that, until uniformity supplants the fluctuations of voltage experienced on electricity supply systems, the most perfectly made lamp will refuse to be consistent in its behaviour. Mr. Leon Gaster has voluntarily taken upon himself a little missionary work in these connections, and (leaving the columns of "The Times") has found a platform at the Society of Arts whereon to further prosecute his task, which includes the advertising of the National Physical Laboratory as a fit and proper place in which to set up business relations with the electrical industry. We know that the staff of the Laboratory have a favourable bent towards electricity. But that may pass. Reading between the lines of Mr. Gaster's paper, he is very disappointed with the progress that has been made in the manufacture of carbon filament glow lamps; and the variable results of tests which he included showed that his disappointment is not without good ground. It is clearly alleged throughout the paper that manufacturers do not take due care in the manufacture; and, in the author's opinion, they ought to adopt the precaution of testing the lamps in all the different stages of manufacture, to get a satisfactory result. But when later on, it is found that "there are in all about 45 operations that each lamp has to undergo, all of which are different," the question arises whether the scrupulous and individual testing that Mr. Leon Gaster advises "in the different stages of manufacture" would not be somewhat hampering, and add to the cost of production. Seeing, too, "a large percentage of the lamps has to be thrown aside if the manufacturer is at all anxious to keep to the specification,"

there would no doubt be, with the frequent testing that is proposed, a still larger percentage of rejections. The diagrams that were published in the paper give reason for this statement. In one case, the curves of the illuminating power and watts used by twelve lamps of one maker (running for the same life-test and under equal conditions), show results varying considerably; and, in other diagrams, the average performance of lamps made by different manufacturers supply still greater variations. How can one avoid an inclination to a little merriment, on looking into these confessions, when the gibes of electricians at the incandescent mantle are remembered? The loss of candle power which they fancy they detect in the mantle, is really due to the burner, and can be remedied, without renewing the mantle, in a manner so simple that householders who are not electricians have no difficulty in keeping their incandescent burners up to the mark for weeks and months without incurring any expense; whereas nothing but renewal will suffice in the case of deteriorated carbon filament lamps.

The question of the effect of variations in voltage on the illuminating power of the lamps was liberally illustrated in the paper. One of Mr. Gaster's experiments showed the relations existing between the light given by a lamp carefully marked for candle power and the voltage at which it was intended to work, as well as the relation existing between the efficiency—that is to say, the consumption of watts per candle—and the life of the lamp. He took an Ediswan lamp, which was marked 60 volts, and which was "supposed" to give 27-candle power at that voltage. On putting the lamp in a circuit with fluctuating voltage—say, from 41 volts to 68 volts—it gave only 1·71 candle power at 41 volts, consuming 20 watts per candle power, and having an extraordinarily long life; and about 48-candle power at 66·5 volts, consuming only 2·3 watts per candle, and having a very short life. Used, however, at 60 volts, as intended, it would, so Mr. Gaster asserted, have a useful life of more than 800 hours, and consume 3·1 watts per candle power. But how are the users to be protected? It is little use marking the lamps for candle power and voltages, and duration of life efficiency, if these are all to be annihilated by voltage vagaries. It is evident that rectification should begin at home. Free lamp renewals and the offer of lamps *at less than cost price*, as advocated by the author, in order to keep consumers' lamps up to the mark, is only going part of the way towards ensuring consistent illumination. The suggestions, however, raise another consideration. In the case of municipal electricity undertakings, neither the one proposal nor the other should be entertained without due provision being made in the charge for electricity to cover the renewal or the loss incurred in supplying lamps below cost price. Such proposals do not come with any particular freshness; and no doubt their adoption has been somewhat retarded by the disapproval that it is known would emanate from irate traders in electrical fittings. Unquestionably, in the proper selection of lamps lies part of the secret of how to secure economies for the consumer; but there are grave objections to selection and recommendation being succeeded by free supply or sale at a loss. The long and the short of the matter of the inefficiency of incandescent electric lamps appear to be that station engineers have a grievance against the lamp manufacturers; while the latter on their part have a grievance against the station engineers for the ill-treatment which brings their lamps into disrepute. From the Engineering Standards Committee, there will in all probability issue a standard specification for carbon filament lamps; but whether the lamp makers will be unanimous in adhering to it is very doubtful. Standardization, however, will not be a guarantee of any stated efficiency, seeing that the life-test is carried out on a steady pressure, while the lamps are used in ordinary circuits which, as Mr. Gaster says, "in many parts of the kingdom have variations exceeding the Board of Trade limits."

With the parting shot, that there appears to be no immediate prospect of making very great strides in improving the efficiencies of carbon filament lamps, except by regulating the manufacture to standard specifications regarding the marking and behaviour of lamps in the life-test, Mr. Gaster passed in review some of the new types of lamps which have been brought out during the last six years—viz., the Nernst, the Osmium, the Tantalum, and the Zirconium. Our readers are well aware—electricians take good care that it shall be generally known—that these lamps have a considerably higher efficiency than the carbon filament type of lamps; but the facts that they have all constitutional drawbacks, and their first cost is high, are not proclaimed from the house-tops. But these are things that militate against general adoption. That electrical engineers should hide the shortcomings is not a politic proceeding, as users who are induced to adopt the lamps are not long in being made aware of their existence. In the case of the Nernst lamp, the consumption is only from 0·9 to 1·9 watts per candle; but there are certain drawbacks—two mentioned by the author being the delay in starting the burner when the lamp is switched on, and the necessity of keeping to the polarity with direct current circuits. The Osmium lamps burn with an electrical efficiency of 1·5 to 1·8 watts per candle. The marked drawback of this lamp is the brittleness, and the consequent difficulty of handling for transport. Then the Tantalum lamp, with an efficiency of from 1·5 to 1·7 watts per candle, cannot conveniently be used on alternating currents; and as breakages occur in the delicate filaments, so the illuminating powers decrease. Then the Zirconium lamp, which is the latest of the class using rare metal filaments, is supposed to consume only about 1·2 watts per candle. This lamp also suffers from the need of tender handling during transport. With all these lamps considerable care is required in use; and they further demand that there shall be exquisite attention to the matter of suitable voltage. Neglect produces disaster. The lamp manufacturers are as fully alive as Mr. Gaster to the fact that there is a large field for a lamp that can be used with the same fittings, retaining the usual methods of working and distribution, and which will stand a 10 to 20 per cent. fluctuation of voltage, without easily being destroyed or losing much of the initial candle power and efficiency. It is, however, always easier to advise than to perform.

Like most papers presented to the Society of Arts, this one was of great length; and therefore there is only one other section which we can briefly review. It refers to the flame arc lamps, in which increased efficiency of the arc is claimed by the use of a mixture of various substances with the carbon, such as calcium, strontium, barium, boron, or other metallic salts. In this type of lamp, the carbons, instead of being superimposed, are fixed in the lamp at an angle to each other; the effect being "to throw the light downwards without any shadows underneath the lamp." The size of the carbons used in the lamps is very much smaller than those employed in the ordinary arc lamps for the same current; and consequently the consumption of carbons is very much increased. Therefore to produce a lamp of fairly long burning hours, automatic magazines have been provided by some of the makers. But the man who places implicit reliance on automatic magazines must be a delightful sort of person to have dealings with. The "Oriflame" may be taken as a typical example of the style of lamp now generally manufactured; and the burning hours of this are from forty to fifty—the carbon ends being automatically discharged one after the other as they are consumed. The manufacturers are still exercising themselves in obtaining a more steady burning of the lamps. Very special attention, too, has to be paid to the construction of the lamps, as the vapours given out by them, owing to the nature of the salts used in the carbon cores, have to be rigorously kept away from the mechanism. The candle-power of these lamps is stated to be somewhat difficult to measure; but the generous estimate which electricians accord a 10-ampere lamp, at 44 volts, is 1800 candles—the stated efficiency being about 0·25 watt per candle. The extraordinary care that is taken not to put such figures as these forward as positive, is very noticeable. One other point. Although the efficiency of the flame arc is an improvement on its precursors, it has been found impossible so far to make enclosed flame-arc lamps, owing to the smoke and gases given off by the chemicals used in the treated carbons. We think it is not unfair to say that even disinterested readers would leave Mr. Gaster's extensive paper with the view that the electrical industry is not particularly joyful over the incompleteness of the advances made in electric lamp manufacture during recent years. In the matter of efficiency, as tested by consumption per candle power, there has undoubtedly been a move forward; but the satisfaction over this is largely modified by many other things that have to be taken into consideration before perfection can be claimed. Perfection is slow in coming; but active brains are being devoted to its attainment.

There was one gem in the course of the discussion which fell from the lips of Sir William Preece, and which ought not to be lost to the gas industry. He said: "The lighting capacities of the incandescent and arc lamps had improved very much; but there was a good prospect of the cost of electric energy diminishing in a larger ratio. Hitherto consumers of electrical current had been in the habit of paying 4d., 5d., and 6d. a unit. But the time was rapidly approaching when the pennies would be reduced to halfpennies, and their poor gas friends who were struggling very hard indeed at the present time to obtain dividends on their capital, would find a greater difficulty than ever, and probably the time would come sooner or later when even they would have to consider the generation of electrical energy." The pennies in the case of street lighting, "cooking and heating," and motive power have been reduced, in numerous places not only to halfpennies but to farthings; but it is not the gas companies who are struggling hard to obtain dividends. Limited indeed must be Sir William's information if he has not heard of the trials and struggles within the field of his own professional occupation.

The Rare Earths—"Die Darstellung der seltenen Erden."

An exhaustive treatise upon the production and properties of the rare earths has recently been published by Veit & Co., of Leipzig; the author being Dr. C. Richard Böhm. The work is in two volumes. The first contains a bibliography of the subject, the behaviour of compounds of the rare earths with reagents, crystellographic data, microscopic reactions, and methods of separating them one from another. In the second volume are described methods of separating the rare earths and other elements, an account of their various ores, and special reference to the quantitative determination of cerium, praseodymium, and thorium. There is also a chapter on the calculation of atomic weights, on spectroscopy, on radio-activity (so far as rare earths are concerned with that phenomenon), and on the uses of the earths dealt with. The subject of the incandescent gaslight is, however, treated of more fully in a separate book written by the same author and published a short time ago.

THE SYSTEMATIC KEEPING OF GAS COMPANIES' ACCOUNTS.*

A Fresh Edition thereon, combined with a New Work, entitled "Useful Forms for Gas Undertakings."

It is now over five years since the first edition of "Gas Companies' Book-Keeping" was published, and for a long time it has been out of print. This is the best indication that the book, to use the expression one so often hears, and which the authors employ in the preface to the second edition, filled a "long-felt want." Another indication is that it was followed in the course of a year or two by no less than three other works on the accounts of gas undertakings. The authors appear to look upon this as the best testimony to the necessity for such a work as they produced; for the preface to this edition contains the following pregnant sentence: "If it be true that imitation is the sincerest form of flattery, the authors of this work have abundant cause for self-congratulation." The second edition is the outcome of the numerous inquiries for the work since the pioneer edition ran out. It contains several alterations which will, we have no doubt, commend themselves to those who are engaged in the clerical departments of gas undertakings.

Attention is properly called to the enormous development that has taken place in the intervening five years in what may be termed the progressive branch of gas distribution—slot installations, incandescent maintenance, increased facilities for hiring gas appliances, &c., all of which have in part conduced to some modification in the methods required for the purposes of record. Books that, with simple rulings, were formerly amply sufficient for these purposes, are now utterly inadequate to the requirements of any progressive undertaking. Where necessary, therefore, in this edition, additional analytical columns have been introduced, always keeping in view the essentials—the saving of labour, and the minimum risk of errors. To make room for the additional explanatory matter which this has entailed, the authors have deleted some portions that appeared in the first edition. For example, we find that the extracts from the Acts regulating the keeping of accounts and notices of meetings are now absent; the reproduction of Schedule B of the Gas-Works Clauses Act, 1871, is left out; and so on. The legal aspect of gas accountancy, however, is amply treated of in other works, to which, when necessary, the inquirer on these points can refer; and the matter which has taken the place of that deleted is much more likely to be of service to the gas-works accountant. At the same time, the features which the authors considered essential in the first edition are retained—viz., lucidity in describing the various forms and books, so that the raw clerk may be enabled to obtain a thorough grasp of the methods of recording the transactions from the simplest form or entry book, right through the postings to the various ledgers, and the final preparation of the statement of accounts. The functions of every book are again illustrated in a practical manner by postings, as in an actual set of account books. Turning from the general to the particular, we find that a chart appears as a frontispiece; and this shows at a glance the linking up of the various books of entry with the ledgers—a ready means of distinguishing between debit and credit postings being furnished by the use of dotted or full lines.

The treatise is again divided into two parts. Part I. consists of three chapters; being devoted to the "record" books of shares and stock, transfers of shares and stock, meetings, and "record" books of mortgages and bonds. Each folio of the share ledger is divided into three horizontal sections, so that the holding of any individual shareholder of any class of shares can be seen at a glance—a considerable improvement on the one shown in the first edition. A form of stock ledger is also given. Another improvement is the introduction of distinguishing share columns into the register of shareholders. Part II. deals with the financial books of the Company. The model set consists of 22 books, which in the treatise are illustrated consecutively, so that postings from one book to another can be easily traced. The descriptive matter occupies ten chapters, explanatory of the treatment of purchases, sales of gas, sales of fittings, cash-books, ledgers, stock-books, nominal ledger accounts, &c. Some essential features of this portion of the work are:—

1.—Original entries are utilized as much as possible, thus preventing loss of time and risk of error.

2.—The books and ledgers are numbered consecutively, thus facilitating the student's reference from one transaction to the other.

3.—The carbon system is freely used, by which office entries and customer's invoices are obtained at one writing.

4.—The fittings book, being on the tabular system, saves laborious postings to nominal (or impersonal) ledger.

5.—With the slot system, there is no accumulation of work at the end of the quarter or half year. As described, it may be used either with or without receipts being given to customers, and is equally adaptable whether there is only one or fifty slot collectors. It enables, also, a ready comparison to be made of the work done by each collector.

6.—The residuals invoice book is so arranged that the items are not "monied" separately, but in one total at the end of the month. There is thus only one monthly posting to each customer's account.

7.—In both the fittings and residuals credit sales book there is a direct reference from the ledger to the copy of the invoice sent to the customer.

8.—When once a carbon invoice is made out, its correct posting is assured, as the ledger is "proved" independently by comparison with the entries in the fittings book, or a residuals credit sales monthly summary, which method would detect any invoice omitted to be posted or incorrectly posted.

9.—The "route" of a customer's order for fitting work (labour and goods) is shown by a sketch, so that the student knows exactly what part any form or book takes in the system, and can see the route from the customer's order to the fittings or nominal ledger.

10.—The petty cash book is designed with analytical columns, so that the analysis proceeds as, and when, an entry is made, and is not left to be rushed through at the end of the month.

11.—An efficient system of monthly proving is fully explained. At the end of the half year, therefore, if the books fail to balance, and the system described has been followed out, there will be only one month's (the last) transactions to go through.

12.—A voucher-book register is introduced, thus preventing a possibility of fraud by the use of of a "spare receipt book."

13.—Five ledger-proving accounts are introduced, and an explanation given of their use when proving the ledgers.

So much for some of the features of the set of financial books. Following these is a chapter on balancing the books; and we venture to think that chapter 15, which explains what to do before the end of the half year in order to be sure of getting out the balance-sheet as quickly as possible, will be found one of the most valuable parts of the work. In this chapter, too, are given full instructions as to what is required to prepare for the audit—each book or ledger being treated independently in setting forth the work required to be done. Chapter 16 gives full instructions as to the preparation of the statement of accounts as specified in Schedule B of the Gas-Works Clauses Act. An explanation is also given of the double account system. Chapter 17 is devoted to several sundry books on entry forms, &c.; and chapter 18 deals with statistics. The analysis of accounts is fully dealt with; and a specimen analysis form is made up from the model set of books illustrated in the preceding chapters. Some pertinent remarks on carburetted water gas, oil used for enrichment, the record of laboratory tests, raising of capital by local authorities, annuities, sinking funds, and redeemable bonds, &c., appear in chapter 19. A copious index, extending to fifteen pages, accompanies this portion of the volume; and this brings us to another important departure from the first edition of the work.

The forms which take no actual part in the financial transactions of a gas undertaking are now kept entirely separate, instead of being sandwiched between the descriptive matter of the financial books. By this means, references to postings, &c., have been facilitated; and the additional matter has not been introduced into this portion of the work at the expense of lucidity. It was intended to publish these forms separately; but the authors decided that, as the two works were so closely linked together, it was better to retain them in the same volume with the treatise on "Gas Companies' Book-Keeping," and this has been done under the head of "Useful Forms for Gas Undertakings." There are 51 forms illustrated. The first 16 are such as are required in convening meetings of directors, transfers, transfer deeds, conversion of shares into stock, forms of resolution, allotment letters, &c. A carbonizing record is given adapted either for coal gas or carburetted water gas. Forms 21 to 34 range from hire-purchase agreements and application forms for slot meters, cookers, &c., to the incandescent maintenance record book. A series of four letters calling customers' attention to unpaid accounts is given.

A rather novel departure for a book of accounts is the reproduction of two or three forms of advertisement circulars. The first deals with the advantages of gas-fires for bedrooms, the second notifies incandescent burner maintenance, and the third sets forth the advantages of gas-cooking, gas for hot-water supplies, &c. If these achieve no more than to start those who have as yet done nothing in this direction, their inclusion will be abundantly justified. One important improvement on the first edition should not be overlooked—viz., that the best sizes in which to order the respective books, forms, &c., are given at the foot of the illustration. Thus: Dividend cash book, "page 10 in. wide by 15 in. deep." Form of gas bill, "size 5 in. deep by 8 in. wide." The volume concludes with a table showing the number of years in which, at various rates of increase, the make of gas will double itself.

* "Gas Companies' Book-Keeping" and "Useful Forms for Gas Undertakings." By J. H. Brearley and Benjamin Taylor, F.I.P.S. The two works combined in one volume. London: Walter King; 1906.

Gas-Engine Plant for Cement Manufacture.—The Associated Portland Cement Manufacturers, Limited, have made a contract with Messrs. William Beardmore and Co., Limited, of Glasgow, for the supply of seven 400 brake-horse-power Oechelhaeuser gas-engines, together with the necessary gas-producers of the Mason type, with all gas-cleaning plant and accessories. The plant is for the Swanscombe works of the Association, and will be the first large application of gas-driving in the cement industry.

SOCIETY OF BRITISH GAS INDUSTRIES.

Commercial and Cognate Work.

THE Provisional Committee of this newly-formed Society are religiously conforming to the accepted programme which they originally framed, excepting in the one particular that they are proposing that the election of the Central Council shall be deferred until the holding of the annual meeting in the early part of the summer. Pursuant to their forecast of arrangements, they have called a general meeting of the members for next Tuesday for the discussion of affairs relating to management, for the division of the members into their various sections, for the appointment of what at present will only be the nucleus of the Sectional Committees, and so forth. In other words, this will be the meeting at which a start is to be made in the setting in order of the Society's house. At the business meeting, we assume that only members will be privileged to be present; but within the week, there will be ample time for any principals, directors, or responsible managers of firms who have not already made application for membership to do so, and thus put themselves in position for attending the meeting, and taking part in the constructive work that will be done on this occasion. Following this meeting, there is to be an open one, to which all associated with the businesses of contracting, manufacturing, and supply for and to gas undertakings are invited; and it will then be seen that serious work is intended to be taken in hand in considering commercial matters of general moment. A paper is to be read on the subject of "Contracts" by a gentleman who is eminently qualified for handling it, having as a gas engineer had experience of contracts, and having of late made a special study of the legal aspects of the subject. The synopsis of the paper promises that it will be a contribution of exceeding interest and value. The question is one which will appeal to all engaged in commerce; and, no matter the character of an industry, in commerce it has its origin and in commerce it has its end—the technical work of manufacture forming the connection between the one and the other. In such an organization as the Society of Gas Industries, commercial rather than technical subjects must have a pronounced prominence; and therefore "contracts" as a theme for consideration is one that has a particular appositeness. The "Objects of the Society," as framed by the Provisional Committee, and accepted by those who attended the last meeting—at which the Society was established—specifically mentions that one is the adoption of equitable forms of contract and documents, and the advocacy of the settlement of disputes by arbitration.

It was recognized, from the first consideration that was given to the question of the establishment of this Society (in the article published in the "JOURNAL" on Dec. 6, 1904, and which at this particular time we would ask those interested to peruse again), that its programme must needs have a considerable bent towards those primary principles which form the ground-work of commercialism, and to all questions affecting those principles. It is a broad ground upon which the Society may operate; and, as work proceeds, matters of importance having both direct and indirect bearings must necessarily be opened up. It does not appear to be fully realized, although we have tried to emphasize it before, what a powerful and inseparable part of the gas industry the contracting and manufacturing of plant and appliances constitute—the capital and purchasing power that part represents, and the employment that it gives to labour, within works scattered throughout the country (and more particularly in the Midlands, Lancashire, and the North) and outside those works in the execution of contracts in every part of the United Kingdom and beyond. There are at least 200 firms in this country who manufacture the plant and appliances whereby gas is made, distributed, and utilized. But until the present they have had no central organization of their own. And now that a start has been made with one, the ultimate responsible character and respect that the Society will have and command will depend upon every firm identified with the industry. *The Society can be exactly what they choose to make it.* But we are on the utility of the Society in connection with commercial questions. The iron, steel, coal, chemical, and other trades are sources of supply and outlet for the gas industry; and therefore, in conjunction with the productive work of the manufacturing section, it must be apparent that such questions as tariff reform, municipal trading, capital and labour, contracts, taxation, freights, and other subjects that will occur to the mind on deliberating upon the openings for activity, will fall within the province of the Society to discuss. And should the idea of the appointment of a Minister of Commerce receive embodiment—we regard this as most important—the Society will be able, with the Institution of Gas Engineers, to speak authoritatively on matters relating to the gas industry, just as other industries with such organizations are in a position to do. There is in existence a Commercial Department of the Board of Trade; but we have never heard of there having been any consultative relations between that Department and the gas plant, appliances, and supply industries. The reason for this is made conspicuous by the absence hitherto of a representative body. The oppression of industry through the heavy rates caused by the municipal policy of making expensive excursions and causing waste beyond the legitimate sphere, rises grimly before us as the question of representation of the industries with which we are identified is considered. The oppression is reflected by the action of certain firms in the East-end of London seeking habitation more favourable to their enterprise. With any steps that are taken in the effort to produce the reform of municipal ways, the Society as such—without individual firms if they do not so desire being identified in the matter—can unite themselves. The London Chamber of Commerce are inviting other similar chambers, local authorities, and industrial organizations to a conference to consider the questions of the audit and standardization of municipal accounts, as a first step towards reform. Had the Society of British Gas Industries been a little further developed, and its Council an entity, there could have been association with the London Chamber of Commerce in this direction.

These things are pointed out as being supplementary to the fields of activity and co-operation with the Institution of Gas Engineers, the District Gas Associations, and the other organizations. There are matters in which the Institution of Engineers and the District Gas Associations, being composite bodies (containing both municipal and company officials), can have no part; and the gas industry has perforce to be unrepresented through the want of an independent body. This is a vacancy which the Society of Gas Industries can well fill. For so doing, the third defined object of the Society suffices: "To give the Legislature and public bodies and others facilities for conferring with, and ascertaining the views of, persons engaged in the gas industries as regards matters directly or indirectly affecting those trades" [specified in the preceding object]. Manufacture and commerce, too, has its obligations in respect of labour; and those whose works come under the provisions of the Factory Acts, and who are concerned in such things as Employers' Liability and Workmen's Compensation, will find the Society of great use, in connection with proposals regarding the amendment or extension of legislation affecting those questions. Though large employers of skilled and unskilled labour, the manufacturing side of the industry has had no voice or opportunity of expressing opinion in the framing or amendment of the laws governing their relations with those they employ. All matters which affect their commercial well-being, and add to the financial weight which their existence and operations have to bear (such as have been generally instanced above) mean to the manufacturers pounds, shillings, and pence. Those firms whose policy in these matters is that of *laissez faire*, and who do not think that there is scope for beneficial work on the part of such a Society, cannot have fully considered and realized the opportunities for activity that lie around. And here we have only instanced a few, without again going over questions which have been touched upon previously. If only for the sake of representation, the Society is worth developing to the fullest extent.

It has been mentioned that it is proposed to delay the appointment of the Central Council until the annual meeting; and it is to be distinctly understood that the Provisional Committee will not succeed to the Council in virtue of the fact that they, with great self-sacrifice, have been devoting themselves to the details of organization. The Council will, in accordance with the rules, be the selection of the Sectional Committees; and it is felt that the delay of the election of the Council to the annual meeting, in the summer, will enable each section to add to its numbers, and send to the first Council a representative or representatives (as the rules may provide) who, in the general view of the Sectional Committee, may be in a position to best serve the objects in view. The Provisional Committee have worked well, and have, without stint of time and expense, devoted themselves to the duties with which they were charged, and which they, for the general good, took upon themselves without demur. They have found, as the Electrical Manufacturers found before them, that the details connected with the promotion of such an organization absorb much time and thought. But the drudgery (as it were) has now been passed; and administration and prosecution of aims will be the work devolving upon the Council, which will be broadly constituted of representatives, as already said, from each section. We have held from the first that it is imperative that the Council should be a strong one, and composed of men who have, through long association and work in the industry, won the esteem generally of the industry in its various divisions. There are certain firms who have not yet united themselves with the Society, whose position and influence would be of the greatest possible assistance in carrying out the objects of the organization, and whose presence would do much in cementing together the various sections in a homogeneous body. The question of representativeness, we know, is one that has weight with the firms to whom allusion is made. We ask them whether completeness of representation is to be obtained by their holding aloof or by membership? If the answer is membership, then they must agree that the reason for abstention from it should be written down as an irrational excuse. It was said in an address that was delivered at the meeting of the Society at which its formation was resolved upon, that its main object was to endeavour "to advance the interests of the great gas industry in a just and honourable manner." All principals, directors, and responsible managers of firms identified with the gas industry who sympathize with that main object should assist in furthering it. They have now the opportunity.

Sir William Crookes, who, as mentioned last week, has lately ceased to be one of the Examiners of the London Water Supply, has just been elected a corresponding member of the Physical Section of the Paris Academy of Sciences.

A NEW GAS-WORKS CLAUSES ACT.

By V. Balfour-Browne, Esq., B.A., Barrister-at-Law.

About a fortnight ago, there appeared in "The Times" a letter from Mr. Newbolt, condemning what he called "the pernicious system of legislation by reference," and also a leading article founded upon that letter. "Can anything," the writer of the letter asked, "be more unscientific, more confusing, or more stupid than an Act of Parliament which is superimposed upon ten previous Statutes, some of which it partly repeals, and some of which it ignores?" And the desire of such reformers seems to be, to have each and every Statute complete in itself. Now, there is a specious simplicity about such a proposal, which is apt to commend itself to superficial students of the Statute Book. It is often annoying to find that you are referred from one Statute to another; and it would, to the lazy, be a considerable advantage to have all enactment by explicit clauses contained in one Act, instead of having to search through many Acts of Parliament, with a chance that the real Statute-law may not be found, even after this laborious paper-chase.

But there is far more to be said for legislation by reference than some people seem to think. It is admitted in the leading article in "The Times" referred to above, that in certain cases it is not only justifiable, but obligatory; and the writer adds: "The legislator cannot repeat in every Statute the Summary Jurisdiction Acts, the Arbitration Act, the Lands Clauses Acts, or scores of other measures which contain provisions of general application." Indeed, this kind of referential legislation is most useful; and it is my view that it has not gone far enough, but that in certain directions a new Clauses Act might with advantage be passed, which could be incorporated with all Acts of a particular class, by reference.

The Lands, the Railways, and the other Clauses Acts, passed in the years 1845 and 1847, are Model Acts of Parliament; and they were made in the way in which all sound legislation ought to be made—namely, from experience of actual needs, and also from experience of the means and methods which were necessary for remedying those needs. It had been usual, before 1845, to introduce into Acts of Parliament a large number of clauses with reference—to quote only one instance—to the taking of lands by agreement and by compulsion. These clauses had been found to work well; and as they were under the hand and seal of experience, it was thought wise to incorporate them in a General Act, and to apply them by mere incorporation or reference to all undertakings where land had to be acquired. In this way, an enormously bulky Private Bill was avoided, and vain repetition was obviated. These Acts of 1845 and 1847 have stood the test of time; but as years have gone on, it has been found necessary to modify the general provisions by Private Act in certain particulars. Thus section 92 of the Lands Clauses Act gave the owner of a house or manufactory part of which was going to be taken, the right by counter-notice to require the promoters to take the whole. In many cases, this was felt to be a hardship; and in many Private Bills a clause has been inserted to the effect that, if the part required by the promoters could be severed from the remainder without material detriment—that being determined by an Arbitrator—the compulsory purchase of the whole was not to be insisted upon, although, of course, full compensation was to be paid to the owner for the detriment and severance. This is only one illustration of the necessity of sending our Statutes back to the mint from time to time to have the necessary amendments made in them.

But it is with regard to a new Gas-Works Clauses Act that I desire to speak here. As is well known, the Gas-Works Clauses Act was passed in 1847; and there was an Amending Act passed in the year 1871. But, in my view, there is need for a further Gas-Works Clauses Act. The changes which have been introduced into the legislation with regard to gas undertakings in recent years by Private Bills have been numerous; and as many of these have been approved by all those who are connected with such concerns, it is time, I think, that they should be embodied in an Act, and used by reference in all Private Bills dealing with gas-works.

It is now, of course, well known that, when a gas company comes to Parliament for new capital, they have to provide for the raising of that capital, not by the old method of allotment to existing shareholders, but by sale by auction. By this means, the shares are sold to the highest bidder; and any premium which is realized by the sale goes into the capital of the company, and does not bear any dividend. This important provision, though not applicable to a new company, is one which might well be introduced into a new Gas-Works Clauses Act. Since 1877, there has been a Standing Order (188A) to the effect that such a clause should be introduced into every Bill of the kind, unless the Committee report that it should not be required, with the reasons on which their opinion is founded. I have tried to ascertain whether this saving clause has been acted upon; and I believe it has been a dead-letter.

Then there is the sliding-scale, which is a comparatively modern invention. Under the Act of 1847, there was a means of getting the price of gas reduced when a company had paid their maximum dividends and arrears and had their reserve fund full. But to secure this reduction the complainants had to go before Justices; and this remedy was seldom (if ever) had recourse to. The sliding-scale is intended to secure the reduction of the price of gas by bribing the company to reduce it. The sliding-scale clause provides that there shall be a standard, instead of a maximum, price for the gas supplied. If the company have to charge the standard price, they may divide the standard dividend; but if they have to increase the price of gas (say) 4d. per 1000 cubic feet beyond the standard price, they have to divide 1 per cent. less than the standard dividend. If, on the other hand, the company can, by economy, reduce the price of gas by 4d. per 1000 cubic feet, they may divide 1 per cent. more than the standard dividend. And so, for every increase or decrease of price, their power to divide rises and falls—1d. in the one being equivalent to ¼ per cent. in the other. This is now an almost invariable provision, and might well form part of a new Gas-Works Clauses Act.

There was at one time a doubt as to the distribution of the money available for dividend. In the old days, the stock was raised with a 10 per cent. dividend, later with a 7½ or 7 per cent. dividend, and more recently perhaps with a 5 per cent. dividend. Now, suppose there are earnings sufficient to pay the full amount on all these stocks in a company, no difficulty arises; but if there is not enough, then the question crops up as to how the abatement should be made. There is a clause in many Acts which provides for a proportionate reduction being made in the dividend of each class of stocks or shares; and this is a clause that might well be adopted.

There are, besides, a good many minor matters which are now very frequently included in Gas Bills promoted by private companies which might be introduced into an Act for the purpose of incorporation. Many of these are referred to by Mr. Shiress Will in the introduction to the last (1901) edition of his well-known book. For instance, a power is frequently given to gas companies to let for hire, though not to manufacture, fittings and meters for the supply of gas. Everyone is familiar with the strides which gas companies have made in connection with the supply of prepayment meters and cooking-stoves; but it is almost essential that such appliances in connection with the use of gas should be supplied by the gas company. Their introduction has led to an enormous increase in the demand; and unless the gas companies can supply such appliances and receive a rent for them from the users, it would seem certain that they must have an unequal contest with the purveyors of other illuminants.

A power to refuse to supply gas to persons in new premises who are in debt to the company for a supply to premises from which they have removed, seems to be only a fair weapon in the hands of a company. Many companies have got the power to contract with persons, companies, or local authorities outside their own district for a supply in bulk; and this is a power which may be useful both to a company and to the inhabitants of districts which have no gas supply. It is usual, however, to safeguard this right by a provision that the supply shall be given only with the consent of the local authority in such outside district, and that the contract shall be limited to a period of seven years. Many gas companies have applied for electric lighting powers; but it seems doubtful whether, in the absence of special circumstances, this should be allowed in all cases, and it would appear better suited for special legislation in any particular instance than for universal application in a Gas-Works Clauses Act.

It is useful for sellers of gas to have power to lay pipes in streets not dedicated to the public, in order to enable them to supply houses abutting on such streets; and this clause might well form one of the clauses in a new Clauses Act.

There seems to be a change in relation to the supply of gas which ought to be noted, and had regard to, in legislation. Gas is now being much more extensively used in connection with cooking and heating than with regard to illumination. Indeed, the illuminating power of low-grade gas can be so enormously increased by the use of incandescent burners that the illuminating qaulities are of far less importance now than when the gas was burned in a Sugg's or a flat-flame burner; and many gas companies have in consequence secured parliamentary sanction to the reduction of the illuminating power of their gas, and have given as a *quid pro quo* a reduction in price to the consumers. Not long ago, a great gas company applied for this power in their own district; but they were trammelled by a clause which existed in one of their earlier Acts, by which they were bound to supply the corporation with gas for street lighting, at the lowest price that was being charged to any consumer. The corporation opposed the Bill, and maintained their right to have the gas under "the most favoured nation clause." This prevented the consumers in that great town from securing a gas supply for heating and cooking purposes on the lowest terms. Here, again, there may well be some general legislation; for the time of 16-candle gas has gone by, and the day of low-grade gas is certainly dawning.

I would refer my readers again to Mr. Shiress-Will's book for other clauses which might very advantageously be introduced into such a measure as that I have been advocating; but enough has been said, I believe, to show that the time has come when another Gas-Works Clauses Act might most usefully find its way on to the Statute Book.

THE NEW RETORT-HOUSE AT TOTTENHAM.

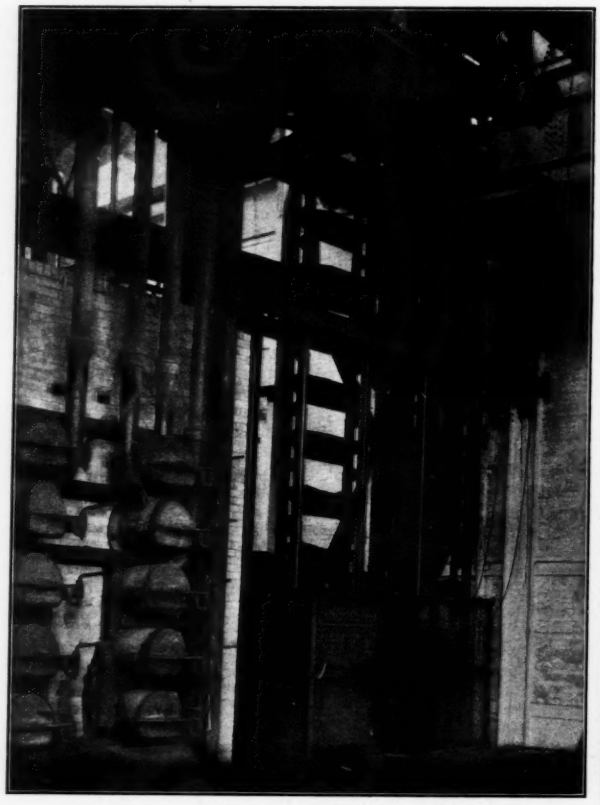
Too late for inclusion in the article published last week describing the new retort-house of the Tottenham and Edmonton Gas Company, the three interesting photographs which we reproduce today were received from Mr. Broadberry. Their publication now will give a completeness to the illustration of the article. It is unnecessary to say anything about the photographs, as they are self-explanatory.

The Roof, Continuous Coal-Hopper, and Other Parts of the Superstructure over Retort-Bench.

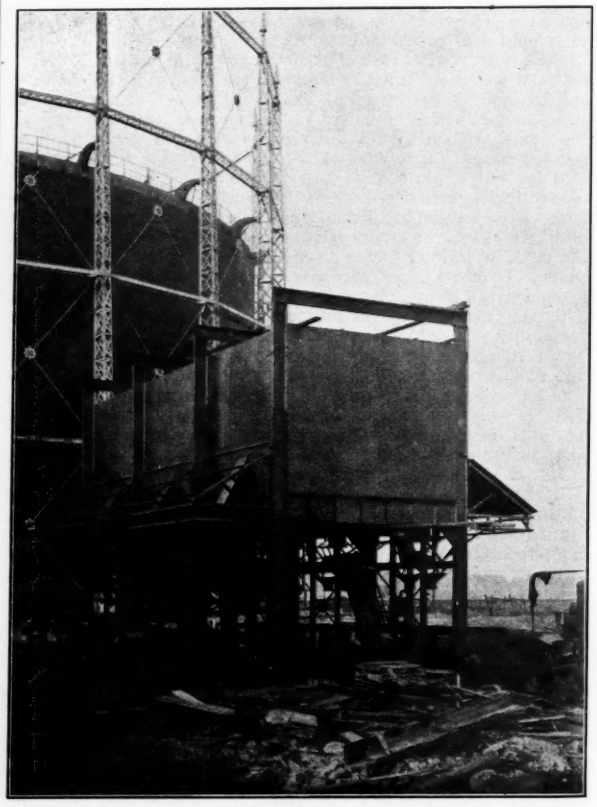
In the first one, we have an excellent view of the construction of the span of the roof over the retort-bench, of the coal-hopper, and of other parts of the superstructure.

The second photograph gives a view of the extreme end of the charging-stage floor next the north gable wall. We get here a clear sight of one of the retort-settings, and of the vertical lines of the 24-inch gravity bucket conveyors, each of which is capable of dealing with 40 tons of coal an hour. Just at the rear of these conveyors is situated Dr. Colman's cyclone tar separator; and in front, but out of the range of the camera in this particular picture, is the temporary service hopper of 15-ton capacity from which coal will be stocked in the at present unoccupied part of the house.

The third view is of the 250-ton coke-hopper in the yard, into the various compartments of which the coke will be sorted and stored ready for direct delivery, as desired, into railway waggons, carts, or sacks. From the landing-platforms, unscreened coke will be sent, by means of the telpher system, to the various stacking-places on the works.



A Close View of One of the Settings, and the Vertical Lines of Gravity-Bucket Conveyors.



The Yard Coke-Hoppers—A Busy Centre for Coke Receiving, Sorting, and Distribution.

Vertical Retort-Settings in Germany.

In view of the interest taken by our readers in the progress of vertical retorts in Germany, Herr E. Körting, the Chief Engineer of the Imperial Continental Gas Association, has sent us a few particulars in connection with it. He says the Deutsche Vertical Ofen Gesellschaft are putting up more vertical retorts in Dessau this year, so that the whole of the gas in the town will be produced by furnaces on this system. The Potsdam station of the German Continental Gas Company is to be provided with verticals to the extent of one-half; and the Oberspree works of the Imperial Continental Gas Association to the whole of their capacity. There are, besides, fifteen furnaces ordered by another Gas Company; and the Gas Committee of the City of Cologne have just decided to propose to the Town Council the erection of twenty-four vertical furnaces during the present year. Herr Körting adds that the results of the Mariendorf 5-metre verticals are now satisfactory in every way; and he hopes to publish details shortly.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Annual General Meeting of the Association was held last Thursday, at the Grand Hotel, Birmingham. The attendance of members was good. At the commencement of the business, the retiring President, Mr. THOMAS BERRIDGE (Leamington) occupied the chair.

The HON. SECRETARY (Mr. Charles Meiklejohn, of Rugby) opened the proceedings by reading the minutes of the autumn general meeting held at Birmingham on Oct. 26. One of the entries had reference to the vote congratulating Mr. Charles Hunt on his recovery from his then recent serious illness. The Hon. Secretary read Mr. Hunt's acknowledgment.

SYNCHRONIZING CLOCKS BY A TEMPORARY INCREASE OF GAS PRESSURE.

The minutes also alluded to the reference to the Investigation Committee of the above subject.

The RETIRING PRESIDENT stated in regard to this that, owing to legal difficulties, the apparatus for synchronizing clocks had only just been got to work. The lawyers for the Clock Company and the lawyers for the Gas Company took such a considerable time in drawing up the agreement that the Investigation Committee had not yet been able to go into the matter; but they hoped to do so before the next meeting.

ELECTION OF NEW MEMBERS.

The HON. SECRETARY reported that the following gentlemen were recommended by the Committee for election as members of the Association: Mr. Thomas Randolph Murray, of Saltley; Mr. Arthur J. Harrison, of Brigg, Lincs.; Mr. Edward Allen, of Liverpool; Mr. Edwin Bertrand Tomlinson, of Birmingham; and Mr. Thomas Hawke Hack, of the Swan Village works.

Mr. J. FERGUSON BELL (Derby) moved, and Mr. B. W. SMITH (Walsall) seconded, the election of these gentlemen—Mr. Bell remarking that the members were all glad to know that their numbers were increasing.

The motion was unanimously carried.

COMMITTEE'S REPORT AND STATEMENT OF ACCOUNTS.

The report and statement of accounts having been circulated (see *ante*, p. 412), the RETIRING PRESIDENT moved that they be taken as read and adopted.

Mr. B. W. SMITH seconded the motion, which was unanimously agreed to.

DISTRICT ASSOCIATION REPORTS.

The RETIRING PRESIDENT remarked that, arising out of the report, he moved that the "District Association Reports" be presented to the members not in arrear with their subscription.

Mr. J. C. BELTON (Chester) seconded the motion; and it was carried unanimously.

DISTRICT MEMBER OF THE INSTITUTION COUNCIL.

The RETIRING PRESIDENT moved that the President-Elect (Mr. Fletcher W. Stevenson) be appointed District Member of the Council of the Institution of Gas Engineers for twelve months.

Mr. W. LANGFORD (Longton) seconded the motion; and it was agreed to.

Mr. STEVENSON briefly acknowledged the confidence of the members.

NEW MEMBER OF COMMITTEE.

The RETIRING PRESIDENT observed that Mr. H. Fowler, of Derby, had resigned his position as a member of the Committee, owing to his Directors' meeting being held on the same day as that of the Committee.

The HON. SECRETARY proposed that Mr. R. O. Paterson, of Cheltenham, be elected to the Committee in lieu of Mr. Fowler, resigned.

Mr. JOHN WEST (Manchester) seconded the motion; and it was passed.

THE CHANGE OF PRESIDENTS.

The RETIRING PRESIDENT said he had now to vacate the chair in favour of the President the members had elected. Mr. Stevenson, he was sure, would fill the office with very great credit to himself, and distinguish the Association among the other district organizations. Mr. Stevenson came from a family long renowned for gas engineering. He (Mr. Berridge) remembered that Mr. Stevenson's grandfather was connected with the Derby Gas Company. His father (who was one of the most distinguished of gas engineers who had ever lived) did very much for the support and encouragement of the industry. Their new President had himself made no mean name. He was a man of impartiality, firmness, and patience, and one who could ever be approached by any one of the members. He gave them help cordially and generously. He (Mr. Berridge) heard that Mr. Stevenson's son was following in his father's footsteps; so that the name of Stevenson would long be connected with the gas industry. He had much pleasure in asking their President to take the chair.

Mr. FLETCHER STEVENSON was welcomed to the chair by great applause.

THANKS TO THE RETIRING PRESIDENT.

The PRESIDENT said his first duty in taking the chair was a very pleasant one. It was to propose a vote of thanks to the retiring President. Mr. Berridge had spoken so warmly of him that he (the President) did not know what to say of him; but he could say this, that if he (the President) was going to be as popular when he left the chair as Mr. Berridge was now, he would have to do uncommonly well. A more popular President they had never had since he (Mr. Stevenson) had been connected with the Association. No one was more easy of approach for advice than Mr. Berridge. He would do anything for a member. He had done much for the Association; and they owed him a great deal for this. On many occasions, he (the President) had had to thank him for what he had shown and told him. Therefore, he had very great pleasure indeed in proposing that the hearty thanks of the members be given to Mr. Berridge for the way in which he had conducted their business and proceedings during the past year.

Mr. THOMAS GLOVER (Norwich) seconded the motion, which was carried by applause.

Mr. BERRIDGE, in reply, said he was very much obliged to the President for what he personally considered to be the over-flattering way in which he had proposed the vote of thanks, and to the members for the cordial manner in which they had received it. He wished to acknowledge the great help he had received from the Committee and from the Hon. Secretary during his year of office. No one knew the amount of work devolving upon the Hon. Secretary. Everything had to pass through his hands; and a great deal of the success of a President's year of office depended upon the Secretary. He, therefore, with the greatest possible pleasure, acknowledged the valuable help he had received.

The PRESIDENT then read the following

PRESIDENTIAL ADDRESS.

I beg to thank you for the honour you have done me in electing me your President for this year. I feel that I have a difficult task to fulfil in maintaining the honourable record of this chair, so ably filled in the past by gentlemen of distinguished ability in the profession. I must crave your assistance during the year, and indulgence for shortcomings you may discover in me.

The primary purpose of an Association such as ours is to afford opportunity for members to meet for the interchange of views on current matters connected with our profession, and to hear and discuss papers upon new processes and old ones adapted to our requirements; and I would urge on members that it is the duty of all to bring forward at the meetings, by means of papers, anything which they have found of use to themselves.

This should not be confined to those only who are in charge of large works, because such papers would be of use more to those who have charge of works of a somewhat similar size, while the majority of our members are in charge of medium and small-size works. It is to the younger members, full of energy and of enthusiasm, that we look for papers that assuredly must prove of the greatest service to the the majority of members.

The establishment of the Midland Junior Association—due to the initiation of our ex-President, Mr. Thomas Berridge, stands as a record of his work on behalf of this Association during the past year. The details of organization, however, fell to the lot of our Hon. Secretary, Mr. Charles Meiklejohn; and our thanks are due to him for his guiding hand and willing assistance in carrying out the arrangements necessary to bring the Junior Association into being and launch it fairly on its way. A great deal has been said and written of late upon the education of gas engineers; but I think the highly technical character of some of the papers read by our Juniors shows sufficiently that the education of the gas engineer bids fair to be as thorough and complete as that of the mechanical engineer.

A very thoughtful lecture was given during the present session before the Coventry Engineering Society by Mr. A. Walker, of the West Ham Technical Institute, upon the subject of the technical education of the engineer; and the lecturer advocated that the early years after school should be spent in the works or workshop, and theoretical knowledge obtained through evening classes. This may or may not be the best method of training for a purely mechanical engineer who requires a maximum of theoretical knowledge and whose lot may not ever be the management of works. But for a gas engineer, I believe it to be absolutely the only method of training, because the management and control of works and workmen is the most important part of our duties. It is quite useless to be an engineer and able to design structures and buildings if, as gas engineers, we cannot manage the workmen and get the best results from the plant. After all, it must not be forgotten that our aim is to make and sell gas as cheaply as possible; and he who does this best is doing more useful work than the engineer who designs and builds fine works but is not capable of obtaining fine results from them. I do not wish to be misunderstood. I think it is most important that every young man entering the gas profession should study and obtain a good knowledge of engineering; but it should not be at the expense

of obtaining experience in the control of works. I would, indeed, advise young men—and I think the advice might be well extended to those who do not consider themselves quite young—always to have some study in hand, especially during the winter months, outside those wholly applicable to gas, the knowledge of which may possibly be of great use at a later period of life, and may be of material assistance in promotion later on.

It is a pleasure to know that we represent a business which is more alive to-day than it has ever been. I remember well the electric scare, when it was thought that the knell of gas had been sounded, and the so-called coal famine in the seventies, when it was actually stated in evidence before Parliamentary Committees that the price of coal would never again be within many shillings a ton what it had been. But the incandescent mantle was invented (electricity, so far as lighting is concerned, is now only a bogey to be laughed at); and coal sank in price to a lower figure than before the famine. Now we have the penny-in-the-slot meter with which to fight petroleum, and the cooking-stoves to help us oust coal for cooking; and I doubt not, too, that in time we shall have a gas-fire that will prove as economical as our open-grate coal-fire.

I think, however, it must be admitted that in suction gas we have a young and vigorous opponent, more difficult to lay than those to which I have already referred. Of course, the advertising puffs and promises given by makers of the plant for this gas are, as usual, absurd. For instance, one firm advertising in the "Birmingham Daily Post," soon after the Corporation had reduced the price of gas for motive power to 1s. 6d. per 1000 cubic feet, gave an estimate of the comparative cost of running an engine on town gas at 1s. 6d. and suction gas—showing the saving by suction gas was still 70 per cent. But the only charges taken as cost of suction gas were anthracite coal and water; all costs for labour, depreciation, interest on outlay, and maintenance of plant being omitted. In Coventry, we have only one suction-gas plant supplying a small engine, one pressure producer plant supplying a 60 brake-horse-power engine, and three other large pressure plants are on order under guarantee that the gas will be suitable for brazing and heating japanning stoves in addition to driving engines. It remains to be seen whether such guarantee can be carried out. If it can, and other manufacturers follow the lead set them, then it cannot fail to be serious to the gas undertaking in Coventry, as 19 per cent. of the gas sold is used for driving engines; while if brazing and enamelling is included, then probably one-third of the output of gas is used for these purely manufacturing purposes.

If suction gas and other forms of producer gases are to prove so successful that they will adversely affect gas undertakings in large manufacturing towns, they will far more affect the electricity undertakings; and it is worth while therefore to look at the comparative position of these friendly rivals. The price of gas in Coventry is 2s. 6d. to 2s. 1d. per 1000 cubic feet, according to consumption per quarter. Electric current is supplied at 4½d. per unit for lighting and 1¾d. to 1d., according to consumption, for motive power. It is not to be expected that there will be much increase in electricity supplied for lighting, because in a manufacturing town the cost is all-important, and the incandescent gas-burner has made it impossible for electricity to compete at the respective prices in Coventry. Competition is, therefore, practically confined to motive power; and in this respect the Electricity Committee, on the advice of their Engineer, have acted on progressive (or, I might say, aggressive) lines, supplying current for this purpose at special low prices, and letting out on hire electric motors—a plan much appreciated by small manufacturers who do not wish, or perhaps cannot afford, to purchase outright motors or gas-engines. On this account, a large number of electric motors are in use in Coventry; and the number is fast increasing. I venture to think, however, that very few of the users realize how much more they are paying for power than they would be if using gas-engines.

Theoretically 0·746 of a unit of electricity is required to develop in a motor 1 brake-horse-power per hour; but in practice the small motors require fully 1 unit, and the larger certainly not less than 0·85 of a unit. Assuming, however, the lower figure to be correct for all sizes, and, with an average price of current of 1¼d. per unit, the cost of each brake-horse-power is 1d. With an average price of gas of 2s. 4d. per 1000 cubic feet, and assuming that 20 cubic feet are required to develop 1 brake-horse power per hour—and this is a very liberal figure—the cost of each brake-horse power hour is 0·56d. The cost of oil and attention for a gas-engine is slightly more than an electric motor, but is very far short of absorbing the difference in cost given. If these facts are correct—and I believe you will think I have rather inclined to favour electric motors too much in the comparison made—is it not likely that suction gas will hit our competitors more hardly than it will us? In addition to this, those who have been persuaded to give up gas-engines and hire electric motors are already finding that the cost is very considerably more; and undoubtedly many in Coventry will revert to gas when the term for which they have agreed to hire the motors expires. The position of the Electric Department will, therefore, not be a fortunate one if motors are returned on their hands, not only because of direct loss in stock lying idle, but also on account of loss through interest and sinking fund charges for capital outlay on cables laid for the supply of current to the motors. The Electricity Department in Coventry lay cables free of charge, whether on public or private property; and the capital outlay per consumer must be vastly higher for electricity than gas, as the Gas Department charge for all services laid on private property, except in the case of slot consumers. The loss of a consumer is, therefore, worse for the Electricity than for the Gas Department.

A satisfactory view of the position of gas is to be found in the large increase in the daytime consumption. In addition to the many uses for which it is requisitioned by the manufacturer, the large number of cookers in use makes a very appreciable increase in this daytime consumption. In Coventry, there are 7450 ordinary, and 7032 slot meters fixed. With the ordinary meters, there are 3466 cookers let on hire, or have been purchased by their users, and 5938 supplied free to slot consumers. I may say in this connection that 10d. per 1000 cubic feet extra is charged for gas to slot consumers, and that each is furnished with a good cooker; but no fittings are supplied free. Where required, an estimate of the cost of supplying and fixing them is given, and the work is done at a very small profit and for cash only.

The growth in the daytime consumption of gas in Coventry is shown by the following table:—

TABLE *showing Increase in Gas Consumption per Annum and Increase in Maximum Day's Demand for Ten Years in Coventry.*

Gas Accounted For.				Maximum Day's Delivery.			
Year.	Total Thousands.	Increase or Decrease.		Date.	Total Thousands.	Increase or Decrease.	
		Thousands.	Per Cent.			Thousands.	Per Cent.
1895 .	346,909	—	—	Jan. 11	1,927	—	—
1896 .	398,734	51,825	14·94	Dec. 24	2,005	78	4·04
1897 .	489,511	90,777	22·77	Jan. 20	2,632	627	31·27
1898 .	499,922	10,411	2·13	Dec. 23	2,613	19	·72
1899 .	491,994	7,928	1·60	Nov. 29	2,425	188	7·19
1900 .	539,743	47,749	9·70	Dec. 22	2,850	425	17·52
1901 .	540,871	1,128	0·21	Jan. 9	2,760	90	3·15
1902 .	575,460	34,589	6·39	Dec. 20	2,920	160	5·79
1903 .	609,273	33,813	5·87	Dec. 11	3,030	110	3·76
1904 .	621,090	11,817	2·10	Dec. 23	2,954	76	2·50
1905 .	610,905	10,185	1·64	Dec. 23	3,074	120	4·06
Increase totals		263,996	76·09	—	—	1,147	59·52

It will be seen that between 1895 and 1905 there has been an increase in the total output of 76·09 per cent.; while the maximum day shows only an increase of 59·52 per cent. The plant is more fully in use now than it was ten years ago; and this means a saving in capital expenditure of about £13,000. I anticipate that this tendency to reach a stationary maximum day's demand the year round will grow with the increased use of gas for workshops and manufacturing purposes. But to encourage this it is necessary that gas should be sold cheaply; and what we therefore have to aim at is to supply it at such a low price as to beat all competitors. To do this, we must undoubtedly supply gas of moderate calorific value and low illuminating power in place of the gas of the higher qualities now supplied. This is already being recognized, as evidenced by the institution of regular testing of London gas for calorific value and the application to Parliament of the Tottenham and Edmonton Gas Company for authority to supply power gas.

It is a strange anomaly that the capital expenditure, in proportion to the business done, varies to an enormous extent in different gas undertakings; some having a capital expenditure so low that it falls very short of representing the amount actually expended, others having a capital as much in excess. There are a few companies who can be found in the latter class, but not many; as companies have always husbanded capital more carefully than local authorities. The reason for this is not far to seek; for though most local authorities have the power to extend and improve their works out of revenue, they are so greedy to obtain as much profit as possible in aid of rates that they are loth to spend it in the improvement and consolidation of their business. Moreover, local authorities can much more easily obtain powers for additional capital; and there is seldom any opposition raised to their doing so. Companies, on the other hand, can rarely go to Parliament for more capital or additional powers without having to meet strenuous opposition from local authorities, to dispose of which it is often necessary to agree to fresh, and sometimes aggravating, obligations. There is, therefore, every inducement to gas companies to look most carefully to all capital expenditure.

The commonest argument used by local authorities in support of taking profits from trading undertakings in aid of rates, is that the rates being pledged it is only fair that the ratepayers should have some return to compensate for the risk run. But, of course, this is only chicanery, because, as far as gas-works are concerned, no risk is run; and I believe I am right in stating that there is no case on record of a parliamentary gas undertaking owned by a local authority having to be subsidized out of the rates, except in the case of a recent purchase from a company, and then only for a few years. If the argument that there is risk be correct, surely the businesslike and proper plan would be to form a strong reserve fund against such a contingency. But, as a rule, a strong

reserve fund in the case of local authorities is not necessary, because the power to raise the price is sufficient protection.

It is only a few years since gas undertakings had to face an abnormal rise in the price of coal; but corporations as well as companies raised the price of gas to compensate for the extra cost of coal, though the logical sequence of the argument of risk to the ratepayers would have been to maintain the price of gas at the same figure it was before the rise in price of coal, and let the ratepayers generally contribute to the loss instead of the gas consumers. But there was no single instance in which this was done. I hold, therefore, very strongly that as the gas consumers have to pay for all extra cost in raw materials or labour, so they ought also to have the benefit when these are reduced in cost. In other words, gas should be sold at cost price subject to a small amount to be set aside annually for a reserve fund. I believe that a great deal of the extravagant expenditure of municipal authorities in recent years has been due to the wish to make profits in aid of rates; and if this power to appropriate profits were prohibited by Parliament, instead of being encouraged as it has been, a more careful expenditure of capital would follow, and the effect would soon be felt in a reduced capital outlay for the business done, proportionately lower capital charges, and consequent reduced prices at which gas could be sold. At present, however, it is a fact that gas is generally supplied by companies more cheaply than by local authorities. This cannot be because the managers of gas-works owned by local authorities are not as capable as those in charge of companies' works, but rather that the profits made by such men are taken in aid of rates instead of in reduction of the price of gas.

It is a truism that the smaller the capital of a business for the amount of business done the healthier that business and the stronger its financial position. Let me give an instance of wise expenditure of capital, for which, of course, I do not take any personal credit. The Sheffield Gas Company, in 1892, found it necessary to increase their manufacturing capacity. They possessed a site for additional works about 2½ miles from the town; and it was decided to build an additional works upon this site. These were designed for an ultimate capacity of 10 million cubic feet per diem; but only one section, of a capacity of 5 million, was constructed first. All the mains underground, however, were laid for the complete works; also the workshops, engine and boiler houses, and meter-house were all built of a size to accommodate the plant for a 10-million works, and 30-inch diameter mains were laid to connect with the other stations. The works were commenced early in the year 1893; and gas was first made in the autumn of 1898. The total expenditure was a little over £200,000. The following particulars show the total capital expenditure of the Company at the end of 1892, the year previous to the works being commenced, and at the end of 1899, the year following the autumn in which gas was first sold:—

Date.	Coal Carbonized. Tons.	Gas Sold. Thousands.	Capital Expended.		
			Amount.	Per Ton of Coals.	Per 1000 Cubic Feet of Gas Sold.
1892 . . .	197,871	1,868,481	£683,699	£3 9 1	7s. 3d.
1899 . . .	261,120	2,551,472	869,861	3 6 7	6 9

It will be noted that the result shows a reduction in capital expenditure of 6d. per 1000 cubic feet of gas sold. Of course, the large increase in the quantity of gas sold partly accounts for this; but an inspection of the amount of capital for the respective years shows that a considerable sum towards the cost of the new works had been derived from revenue. The result of years of such careful husbanding of capital has been to put the Sheffield Company in a stronger financial position than almost any gas company in the kingdom, and to enable them to sell gas at a cheaper price than any company. It is not, of course, possible to do the same at Coventry, where we are now engaged in building an entirely new works—not as auxiliary to the present, but to replace them. But much could have been done if the Council would only have been willing to forego the annual contribution to the rates during the construction of the new works. Unfortunately, however, though the Gas Committee would have agreed to such a course, the Council would not be satisfied without getting its contribution from gas profits.

For the year ended March 31, 1904 (the last available return), the amount handed over in aid of rates by gas works owned by 64 local authorities in England amounted to the huge sum of £478,692. Manchester contributed over 9 per cent. of its total income, Birmingham over 6 per cent., and Leicester over 15 per cent. This sum was taken out of the pockets of the gas consumers—part of it returned to them in reduced rates, and part made a present in the same form of reduced rates to the users of electricity, producer gas, paraffin oil, or non-users of gas for any purpose.

The site for the new gas-works at Coventry was purchased in the year 1898. Up to the present time about £59,000 has been expended upon site, railway sidings, and construction of the works; while, with the exception of the chemical-works, no part of the works has been brought into operation. The interest and sinking fund on the expenditure thus far amounts to £2950 a year; and before the works are ready for the manufacture of coal gas, the sum of £180,000 will have been expended, representing an annual charge of £9000—no easy charge to meet while having to manufacture on the existing old-fashioned and cramped works, with high cost of manufacture involved.

The difficulties presenting themselves to engineers designing new works or extensions to existing works were never greater than at the present time, because of the variety of forms of plant and machinery to be selected from. A very few years ago the rival claims of inclined retorts and horizontals with stoking machinery were the acutest of the problems to solve. But I venture to look upon inclined retorts to-day as out of the running; and I believe few engineers will in the future adopt them in preference to our tried friends the horizontals, now that we have simpler and cheaper forms of stoking machinery available. It may, I think, be correctly said that stoking machinery is made now suitable for horizontal retorts for almost all sizes of works. The difficulty of selection of the description of machine is, however, very great. Some engineers prefer the West type, in which the scoop is used, and others the projector and ram discharger. It seems hard to believe that the projector can or does place the coal in the retort in such an even layer as the scoop, and moreover, the former leaves more to the personal judgment of the workmen than the scoop, on account of the varying speed at which the engine must be run during the charge, so that an even layer of coal shall be placed all along the floor of the retort; and this speed again must be varied with different sizes of coal and for dry or damp coal. But the advantages of the projector, in simplicity of construction and in its comparatively fewer wearing parts, and, again, that one machine will do the work of two when scoops are used, seem to me to outweigh the disadvantages, and to ensure that the projector will prove a favourite. There is probably quite as much advantage, or more, in the ram discharger over the rake as there is with the projector over the scoop. It would certainly seem that though a ram discharger might work well with new retorts true to shape, it would be difficult to use on old retorts; but I have seen the ram working on retorts which have been in use 1000 days with quite as much ease as on new retorts, and I believe this form of discharging coke will be the favourite in the future. It is perhaps too soon yet to say much about the type of machine in which the coal is laid in the retort at the same time that the coke is discharged; but, from personal observation, I have seen it do the work exceedingly well—putting in well-laid heavy charges and discharging the coke at the same time with the utmost ease.

I must not omit to mention the vertical retort, which, apparently, on the Continent has proved successful—at any rate, in one works; but I think he would be a bold man who would venture at present to introduce it in England into an entirely new works without any preliminary experiments. Retort setting and equipment is such an expensive matter that I venture to consider it wise to move too slowly rather than too fast, with the risk of failure.

All these inventions for improved methods of carbonizing, however, show clearly in what great importance retort-house work is held by engineers; and it is undoubtedly true to-day as ever that success or otherwise is secured in the retort-house. It behoves us all, therefore, to carefully investigate new processes of carbonizing or handling materials in the retort-house with the view of obtaining cheaper methods, and so enabling us to sell gas at cheaper prices to compete with our formidable opponents. But in this, as in all other forms of labour-saving machinery, care must be taken that the initial outlay is not too great. To warrant the outlay it is necessary that the saving in labour should more than cover interest on outlay, repairs and upkeep of the machinery, and an ample depreciation. I would impress upon you the importance of liberal depreciation, because, even if the machinery is maintained at a high pitch of perfection, often such rapid changes or improvements take place that it may become obsolete in a comparatively short time. This did not apply in old days, when the only machinery on a gas-works consisted of exhausters, pumps, and a few steam-engines and tools in the workshops; but with stoking machinery, conveyors, &c., we brought in a type of machinery peculiarly subject to high costs for repairs and to rapid improvements. The practice of the Sheffield Gas Company for some years after stoking machinery was installed in their works was to allow 10 per cent. for interest on outlay and 10 per cent. for depreciation before ascertaining the saving effected. This, however, was found unnecessarily high, and I believe has recently been reduced to one-half.

Stoking machinery was first introduced into the Sheffield works in the year 1891; and at the time I left, in 1899, three retort-houses had been equipped. I give (see p. 486) the figures relative to the two sets of machines at the Neepsend works for the year 1898, from which it will be seen the method adopted of comparing the cost of machine work with scoop work by hand.

The figures quoted, I am aware, do not show the comparison so much in favour of machinery as many that have been published; but I believe that none have carried such liberal allowances for interest on outlay and depreciation. In addition, I may say that, owing to the high quality of coke required, it was not thought advisable to put in any form of coke-conveyor; the coke being drawn into barrows, in which it was quenched, and then wheeled into the yard. The costs given also include every charge from the time the coal was delivered into stores until the coke was trimmed in the yard ready to load into carts.

TABLE *showing the Comparative Cost of Carbonizing by Stoking Machinery, and by Hand with Scoops, at the Neepsend Works of the Sheffield Gas Company, for the Year ending Dec.* 31, 1898.

STOKING MACHINERY.

[Coal carbonized, 136,031 tons.]

	Amount. £ s. d.	Per Ton. d.	£ s. d.	s. d.
Carbonizing wages—				
Machine men	2,137 7 0	3·78		
Engine men	424 10 3	0·75		
Lid men	2,455 12 2	4·34		
Fire men	1,263 0 6	2·23		
Slow firing	255 12 11	0·45		
Attending elevators	779 5 7	1·39		
Wheeling coke from stock	280 0 9	0·50		
Coke wheelers	3,863 8 10	6·76		
Trimming coke	25 8 1	0·04		
Sweeping up	563 2 10	1·00		
Attending hydraulic main	134 11 0	0·25		
Scurfing retorts and opening stopped pipes	342 11 3	0·60	12,524 11 2	1 10·090
Repairs and maintenance—				
New parts and replacements for machines	462 13 6	0·82		
Cotton rope for driving	51 12 8	0·09		
Belt, laces, packing, &c.	91 17 10	0·16		
Oil and lubricants	377 6 7	0·67		
Fuel for steam raising	555 9 1	0·98		
Sundries	1 16 7	0·00		
Wages for repairs of machines	377 18 5	0·67		
Ditto of tools	179 12 0	0·31	2,089 6 8	0 3·700
Depreciation, 10 per cent. on £11,929			1,192 18 0	0 2·105
Interest, " " " "			1,192 18 0	0 2·105
Total			£17,008 13 10	2 6·000

HAND STOKING WITH SCOOP CHARGING.

[Coal carbonized, 35,494 tons.]

	Amount. £ s. d.	Per Ton. d.	£ s. d.	s. d.
Carbonizing wages—				
Stokers	2,222 7 11	15·03		
Firemen	621 1 0	4·20		
Slow firing	322 7 11	2·18		
Coal fillers and wheelers	537 11 8	3·64		
Coal weighers	154 13 1	1·05		
Cannel breakers	153 0 2	1·03		
Coke wheelers	710 6 3	4·80		
Pulling down coke-tips	312 12 2	2·11		
Grinding and wheeling	150 3 10	1·02		
Attending hydraulic main	55 10 7	0·37		
Scurfing retorts and cleaning retort-house, &c.	44 5 10	0·30	5,284 0 5	2 11·730
Repairs of tools, &c.—				
Repairing stokers' tools	179 6 4	1·21		
Shovels	46 4 8	0·31		
Scoops and rakeheads	34 10 9	0·23		
Steel barrows and wheels	67 5 5	0·46		
Iron, &c., for tools	41 16 4	0·28	369 3 6	0 2·490
Total			£5,653 3 11	3 2·220

	s. d.
Total cost per ton carbonized by hand	3 2·22
" " " " machinery	2 6·00
Saving per annum	0 8·22

136,031 tons at 8·22d. = £4,659 1s. 3d.

No greater revolution in the construction of purifiers has ever been introduced than that of Mr. Henry Green, of Preston. It has simplified the construction and vastly increased the strength of large purifiers, and reduced the cost of maintenance owing to the greater life of the covers. Then, recently, there have come to the front several new descriptions of grids for purifiers, all claiming to give an increase in the bulk of the material that can be put into them, and great reductions in the back-pressure thrown by the mass of purifying material being more lightly placed in position. Time and lengthened experience only, however, can prove the advantage of these new grids; but one thing I think iscertain—namely, that the cost of grid renewals will be greater with the new forms than with the old.

Two years ago, Mr. Charles Meiklejohn, in his presidential address to this Association, described the process for recovery of cyanides from coal gas brought out by the British Cyanide Company. This process has since been adopted by a considerable number of gas undertakings, and a good revenue obtained by the sale of the liquor containing the cyanide. But it has the disadvantage to those who manufacture sulphate of ammonia that a very considerable portion of ammonia is contained in the liquor, and must be sold with the cyanide. A new system has recently been patented, called the Davis-Neill process, in which the yellow prussiate of soda crystal is produced as a finished article upon the gas-works. The beauty of the process is that there is absolutely no waste, except a little clear water. It is the invention of Mr. G. E. Davis, the well-known chemist, and has been adopted by the Plymouth Gas Company, and is also being worked by the patentees at one of the stations of the Liverpool Gas Company. The plant required is some five times as costly as that necessary to obtain the liquor containing the cyanide in the process of the British Cyanides Company, because, in addition to the washer, which is all the plant that process needs, the Davis-Neill system requires on the gas-works the apparatus necessary for treating the liquor from the washer and converting it into finished crystals. It is stated by the patentees that the process is not suitable for gas-works carbonizing less than 60,000 tons of coal a year, because the relative cost of the plant would be too high. There are two important points to consider before adopting any costly process of cyanide extraction. First, is the market value of cyanide likely to remain permanent; second, is cyanogen in coal gas sufficiently constant to make certain that the quantity found by analytical tests can be recovered?

The following is a short description of the Davis-Neill process: The gas is passed through a washer, which is called the cyanide washer, in which a cream of sulphide of iron and carbonate of soda is placed; and the gas is brought into intimate contact with this mixture. The cyanogen in the gas acts upon the sulphide of iron and the carbonate of soda and forms prussiate or ferrocyanide of soda, together with small traces of other secondary products, and exists in this washer liquor with the excess of carbonate of soda and sulphide of iron, which is necessary in order that the operation may reach finality. This liquor, which is called the washer liquor, is next passed through a still of peculiar construction, which completes the reaction commenced in the washer, and drives off all excess of ammonia. This ammonia can be recovered in the shape of ammonia concentrate, and can either be sold as such or allowed to flow back into a tank in which the ordinary gas water is collected. It is not wasted in any way, nor is there any emanation from it likely to cause a nuisance, as the whole of it is condensed.

The liquor running from the still is then pumped into settlers, where the excess of sulphide of iron is allowed to settle. The clear liquor, which consists mainly of prussiate of soda, together with the excess of carbonate of soda, is passed forward through a filter press into the evaporator. The mud, consisting of sulphide of iron and some insoluble ferrocyanide of iron, is then withdrawn from the settling tanks and treated either with milk of lime or with caustic soda, and the resulting compound passed through a filter press, by which the whole of the soluble prussiate is extracted, and also passes to the evaporator; while the residue of sulphide of iron, mixed with oxide of iron, is either returned to the washer or may be used as a purifying agent—it being about equal in purifying power to ordinary bog ore.

The clear liquor, having been evaporated to about 50° Twaddel, is run into what are termed rough crystallizers, where the crystals are obtained in small granular form. By taking the crystals which are formed at a certain point, the whole of the prussiate is recovered before the excess of carbonate of soda begins to crystallize out; and these crystals are lifted, washed, and drained for crystallization. The mother-liquors from these crystals are then sent back to the washer, or, in certain cases, are evaporated in a separate pan, so as to remove the surplus carbonate of soda and allow the impurities to form the mother-liquor. This can only be arranged when the composition of the mother-liquor is ascertained during actual working, as some varieties of gas give more impurities than others. In any case, the amount of impurity is small; but it has to be dealt with systematically, in order to preserve the absolute purity of the finished crystals.

The rough crystals, after washing and draining, are re-dissolved in water and run into separate crystallizers called pure crystallizers; and here they crystallize into a merchantable article, which only requires to be raised from the vessel and put upon a drainer to drain, when they are ready for sale. The mother-liquor from this crystallizing is used for washing the rough crystals; and the liquor from this washing finds its way back into the tank which receives the filtered liquor from the still. By this method of treatment, the whole of the prussiate is removed from the solutions, and the excess of carbonate of soda is brought back again into the operation and so utilized.

Gentlemen, I thank you for your kind attention to these remarks, which I will conclude by expressing the hearty wish that this Association may be as united and strong during my year of office as it has been in the past, and that it may be a means of usefulness to the members, and to assure you my best endeavours will be given to make it so.

At the close of the address,

Mr. CHARLES HUNT (Birmingham) said it was his privilege and pleasure to propose a most cordial vote of thanks to their President for the admirable address they had just heard. He had listened, and he was sure the members had all listened, to the address with very great interest indeed; and it was one which deserved extended study at their hands. It bore evidence of Mr. Stevenson's appreciation of all the engineering problems with which they were now confronted; and it also bore evidence

of his appreciation of other problems which did not usually fall to the lot of an engineer to encounter, but which were of interest to all who were connected with the gas industry. Some of these problems were of a controversial nature. He was sure that they might sympathize with Mr. Stevenson in his desire that under the existing conditions of the industry, the system of allocating part of the profits of gas to the relief of the rates should be revised and re-considered. There was one little matter which he might be allowed to touch upon, because he thought it might give rise to misapprehension. He was sure Mr. Stevenson would not wish to do an injustice to corporation undertakings; and he (Mr. Hunt) was bound to say he did not quite agree with him when he said that they were less careful than companies of their capital expenditure. He remembered, some years ago, calling attention to the fact that the capital expenditure of local authorities per ton of coal carbonized was becoming less than that of companies—that was to say, the average capital expenditure; and he thought that some figures that were published not long ago went to prove that the reduction continued to be greater in the case of corporations than in the case of companies. He mentioned this, because he knew that Mr. Stevenson would not like to be unjust. He had much pleasure in proposing that a cordial vote of thanks be given to the President for his address.

Mr. J. H. Brown (Nottingham) said he had great pleasure in seconding the proposition; for he was sure they were all greatly indebted to the President for his eminently practical and useful address. Coming as it did from one so well versed in all the matters dealt with, backed up by a lengthy experience in some of the largest works in the country, the address had additional value and usefulness. He was sure, helped by their worthy President, they could look forward to a good year.

The motion was heartily agreed to.

The President, in reply, said he was much obliged for the vote, and for the kind way in which it had been moved and seconded. One always listened to what Mr. Hunt had to say with the greatest respect. He (the President) was obliged to him for mentioning the point he had raised. He had no doubt Mr. Hunt was perfectly right in what he had said, and that perhaps the average reduction of the capital of corporations was now going lower in proportion to the companies'. He should like the word "proportion" to be put in; for if the companies started lower, and the corporations higher, then the latter ought to come down greater in proportion. What he really wished to draw attention to was—and with it Mr. Hunt sympathized—that the money taken from the consumers, and paid over to the rates, was an unfair way of acting; and in these days, when they had to fight much harder than they used to do for business, it was also harder to have to make money to hand over in aid of the rates, instead of reducing the price of gas so as the better to fight their competitors. Mr. Hunt and everyone else, he thought, sympathized with this. He thanked the members very much for the kind way in which they had passed the vote.

Mr. J. T. Lewis (Wellingborough) read a paper, entitled—

STOKING MACHINERY, COKE CONVEYING, AND ELEVATING PLANT, &c., AT WELLINGBOROUGH.

The works and machinery were so fully described in the "Journal of Gas Lighting" of March 1 and September 20, 1904, and the "Gas World" of September 24 of the same year, that it was only at the request of the President that the writer undertook to prepare this paper. He proposes to give only the briefest discription of the plant on this occasion. On referring to the drawings,* it will be seen that the whole of the carbonizing plant has been arranged with a view to removing the coal from the railway waggons, charging and drawing the retorts, removing the coke from the retort-house and elevating, screening, and depositing the same into the hoppers or waggons on the railway siding. The retort-house and coal-store are placed parallel to each other, but not connected, as is so often the case. The space between the two buildings, nearly 11 feet, has been left for the purpose of getting more light and ventilation into the retort-house; and in these respects the results are most satisfactory.

The Coal-Store.

The building is 191 ft. 9 in. long by 64 ft. 3 in. wide inside. The railway siding is overhead, 13 feet from the floor to the top of the rail. Duplicate steam-engines, coal-breakers, and elevators are placed in the centre of the store. The coal and other waggons coming into the store are, as far as possible, shunted into position by the Railway Company; any hauling that is necessary is done by a rope and capstan driven by a compressed air motor. All the coal is weighed over a 40-ton waggon weighbridge.

Retort-House.

The retort-house is 191 ft. 9 in. long by 64 feet wide inside. The top of the stage floor is 9 feet above the level of the ground floor. The side walls are 35 ft. 3 in. high from the floor level to the eaves. The house is intended, ultimately, for fourteen settings of through retorts; but only one side is fitted up. The settings consist of eight ⌂ retorts, each 22 in. by 16 in. by 10 ft. inside measurement.

Stoking Machinery.

This comprises at present one West's combined compressed air charging and drawing machine. The machine, briefly, is equipped with a motor for hoisting, lowering, and travelling. On the right-hand side of the motor is placed the charger, and on the left-hand side the rake. A full charge of coal is held by the scoop of the charger, which goes into the retort once for each charge. The rake is of the usual pattern for West's power machines. One novelty about the rake is the automatic arrangement for taking-up slack or paying-out the chain so as to suit the varying heights of the machine. The operator stands upon a platform placed in front of the motor and midway between the charger and drawer. He has full and easy command of all the levers for working the different parts of the machine. Over the charger is placed a coal-hopper, which holds about 3 tons of coal. The charger, rake, and hopper are all at the same time raised to one level for dealing with the different tiers of retorts. The machine travels on a tramway running the full length of the house.

The Coke-Conveyor.

The coke conveyor trough is placed about 2 feet underneath the charging floor. It is built up of steel plates and angles. The chain is West's patent, of a very strong pattern. The return path is under the ground floor and in front of the furnace producers.

The Coke-Elevator.

The coke elevator and plant consists of elevator framing 55 ft. 7 in. long, set at an angle of 19½ degrees. This is fitted with a special chain of a new pattern. To this chain are attached the coke-buckets; the whole taking their bearings on rollers placed equidistant on the framing. At the top of the stage is a coke-breaker and rotary screen, below which are three hoppers for receiving the coke, broken coke, and breeze. The conveyor and elevator are driven by means of a vertical steam-engine. The air-compressor engine, and receiver are placed in the exhauster-house, and are under the charge of the exhauster and boiler men.

Method of Working, and Cost.

As the overhead siding runs through the coal store, the coal can be unloaded in any part of the store; and as the waggons are all of them fitted with bottom doors, the labour involved is of the slightest. The coal is generally unloaded at the shoots opposite the elevators, and the bulk of it is not handled at all by the coal man. One man, with assistance given for weighing off the waggons and hauling them into position, does all the work, except when using from stock. Nearly two years ago, the Company purchased ten 20-ton waggons, each of them being fitted with two bottom doors. These waggons have proved good earners; but their running has not been free from trouble. The difficulty has been through hot boxes—in the writer's opinion, owing entirely to the method of lubrication insisted upon by the clearing house authorities. During the last twelve months, a modification has been made by bringing the oil up to the underside of the journal, so that it is practically running in an oil bath. The waggons so treated have given every satisfaction, and with them hot boxes are almost things of the past. The carrying capacity is very great; one waggon alone having carried over 516 tons during the past six months.

For the purpose of showing the costs of working, the actual wages paid are given from June 30, 1904, to Jan. 5, 1906 (79 weeks), as during that time the whole work of carbonization has been carried on at the new works. The total wages paid for unloading, stocking, and elevating the coal during the eighteen months amounts to £108 13s. 3d., or an average of 1·38d. per ton of coal carbonized. The coal is elevated from the coal-store into a 60-ton overhead storage hopper in the retort-house. The coal man has no difficulty in unloading and elevating from 80 to 90 tons in the working day of 10 hours. The work inside the retort-house is done by two men each on the day and night shifts. These men do the whole of the work in the house, inclusive of feeding the furnaces, clinkering, pricking-up, removing clinker, &c., charging, drawing, removal of coke, attending to pipes, cleaning and oiling the machine, &c., up to and including seven settings, or 56 retorts. When the eighth setting of retorts is ready for charging, another man is brought in who attends to the furnaces only. The retorts are charged every 4 hours 48 minutes, or five times in the twenty-four hours. The charges average about 364 lbs., or 16¼ cwt., per mouthpiece per twenty-four hours, but vary according to the kind of coal used. Nuts and unscreened coal are now being used; the carbonizing results being satisfactory, although the yield of gas per ton is not quite so high as when a considerable proportion of screened coal was employed. The difference of yield, however, is more than compensated for by the decreased cost of coal.

After more than two years experience of the charging and drawing machine, the writer can speak in the highest terms of praise for the manner in which the work is done. The human element is an important factor to be taken into account when speaking of the way in which the work is carried out; for it is in the power of the men, by neglect and carelessness, to spoil the effectiveness of the machine. The men from the start took to

* The drawings exhibited by the author during the reading of his paper were similar to some of those reproduced in the "Journal" for Sept. 20, 1904, pp. 789-98. See also "Journal" for March 1, 1904, pp. 527-29.

the machine, and have become most efficient operators on it. As we had the privilege of using the first charging scoop of this pattern made, we had also to contend with some difficulties of working an untried mechanism, and at first we certainly had some trouble. Everything was new to the men; and although they were most anxious to do right, they occasionally had to test the strength of the scoop by missing the centre of the retort and bringing the end of the scoop hard up to the mouthpiece with results not always advantageous to the scoop. These early initiatory troubles were soon over, and the work has long settled down to a state of great efficiency.

The charge of coal is laid in the retort in the most perfect manner. Wet and dusty coal is as efficiently dealt with as dry and screened coal. The men can at will vary the weight of the charge if needed by deficient heats, or any other cause. Owing to the size of the scoop, it is necessary to keep the retorts free from carbon; and it is our practice to clean them about every five weeks. With through retorts, carbon is not so much trouble; but with retorts having stopped ends, it may become a serious matter if allowed to collect to such an extent as to cause the scoop to stick in the retorts. The actual time taken to charge a retort is from 8 to 10 seconds, and to discharge one from 30 to 35 seconds. The work has been timed on many occasions by independent observers for a considerable number of retorts, and found not to exceed one minute per retort inclusive of the time taken to travel from one retort to the other. There are very few stopped pipes—in fact, stopped pipes, as generally understood, are not known. Up to the present, the full possibilities of the machine have not been tested. The stoker's work on what is termed the twelve-hours shift. The time actually worked is, on the average throughout the year, about 7 hours per shift. They are paid 5s. 6d. per shift. The work to be done does not at present warrant eight-hour shifts; but if the time comes when the men can economically be divided into three shifts during the twenty-four hours, there will be no hesitation in making the alteration.

The coke, as it is drawn, goes without the slightest difficulty either direct into the furnaces for heating the retorts, or down the coke shoots into the conveyor. The conveyor deposits it into the elevator boot, whence it is elevated either into the hopper of the coke-breaker or down the shoot to a circular revolving screen. The dust passes through the small $\frac{3}{8}$-inch holes in the screen and drops into No. 1 hopper; the broken coke drops through the large $1\frac{1}{4}$-inch holes and goes into No. 2 hopper; while the large coke passes away from the end of the screen, either into No. 3 hopper or into railway waggons placed in position to receive it. The bulk of the coke sold goes direct into the waggons, and is not handled in any way by the men. At this point, the work of the retort-house men finishes. The coke man then deals with it; loading the large coke from No. 3 hopper for the local demand, and screening the broken coke from No. 2 hopper into two sizes—viz., for ranges and for blacksmith's purposes, the resultant breeze being sold for greenhouse use.

A considerable quantity of water is needed to properly cool the coke as it travels in the conveyor. There is fitted over the conveyor trough inside the retort-house two cross-tube spreaders and two longitudinal spreaders, made of 1-inch iron tube, with three rows of fine holes. The water supply is abundant, and is pumped from the well into a 20,000-gallon overhead tank placed about 32 feet high. The water, as it leaves the conveyor, is taken into a cast-iron tank, where the fine dust carried by it settles; the overflow then goes from there into a second settling tank before finally passing away down the drains. If water was scarce, it would be necessary to filter it as it leaves the settling tank and return it to the well for further use.

The fine coke dust from the settling tank and the breeze from No. 1 hopper is used for heating the boilers. The breeze, broken coke, and coke are in the following proportions;—

Breeze	6·92 per cent.
Broken coke	15·00 do.
Coke	78·08 do.
	100·00

The coke is very clean, but smaller in size than that made when removed by hand; but this has not been found any detriment to its sale. The total wages paid for loading and screening coke during the last eighteen months amounts to £101 0s. 10d., equal to 1·28d. per ton of coal carbonized. This item is charged to coke, and forms no part of the manufacturing charges.

The following statements give the cost of manufacture over the last three half years:—

June 30 *to Dec.* 30, 1904 (26 *Weeks*).

Wages, £450 8s. 9d.; coal carbonized, 6782 tons; cost per ton, 15·94d.

The cost is divided as follows:—

		Per Ton.
Coal, inclusive of unloading, stocking, and elevating	£37 8 11	1·32d.
Stokers, inclusive of charging, drawing, removal of coke, furnace work, stopped pipes, holidays, and Sunday stoppage of work, &c.	219 9 10	7·77
Exhauster, boiler, and compressor men	88 8 0	3·13
Foremen (general)	105 2 0	3·72
Total	£450 8 9	15·94d.

Dec. 31, 1904, *to June* 30, 1905 (26 *Weeks*).

Wages, £445 9s. 6d.; coal carbonized, 5633 tons; cost per ton, 18·98d.

The cost is divided as follows:—

		Per Ton.
Coal, inclusive of unloading, stocking, and elevating	£34 8 2	1·47d.
Stokers, inclusive of charging, drawing, removal of coke, furnace work, stopped pipes, holidays, and Sunday stoppage of work, &c.	217 11 4	9·27
Exhauster, boiler, and compressor men	88 8 0	3·76
Foremen (general)	105 2 0	4·48
Total	£445 9 6	18·98d.

June 30, 1905, *to Jan.* 5, 1906 (27 *Weeks*).

Wages, £463 17s. 2d.; coal carbonized, 6476 tons; cost per ton, 17·19d.

The cost is divided as follows:—

		Per Ton.
Coal, inclusive of unloading, stocking, and elevating	£36 16 2	1·36d.
Stokers, inclusive of charging, drawing, removal of coke, furnace work, stopped pipes, holidays, and Sunday stoppage of work, &c.	219 6 0	8·13
Exhauster, boiler, and compressor men	94 16 0	3·51
Foremen (general)	112 19 0	4·19
Total	£463 17 2	17 19d.

Totals for the Eighteen Months (79 *Weeks*).

Wages, £1359 15s. 5d.; coal carbonized, 18,891 tons; cost per ton, 17·27d.

The cost is divided as follows:—

		Per Ton.
Stokers	£656 7 2	8·34d.
Coal	108 13 3	1·38
Exhauster, compressor, and boiler men	271 12 0	3·45
Foremen (general)	323 3 0	4·10
Total	£1359 15 5	17·27d.

The following table gives the wages paid for three months in 1905, and shows the maximum and minimum costs during the year:—

—	January, 1905.		June, 1905.		December, 1905.	
Retorts in use Coal carbonized	64 1200 tons		40 767 tons		64 1390 tons	
—	Wages.	Pence Per Ton.	Wages.	Pence Per Ton.	Wages.	Pence Per Ton.
Coal (wages)	£5 11 0	1·11	£5 15 0	1 80	£5 19 0	1·03
Stokers	28 12 0	5·72	31 12 0	9·90	36 0 0	6·22
Boiler, &c.	15 2 0	3·02	14 11 0	4 56	15 10 0	2·67
Foremen	18 0 0	3·60	17 17 0	5·45	18 12 0	3·21
Total	£67 5 0	13·45	£69 5 0	21·71	£76 1 0	13·13

When the seven beds of retorts are worked to their full extent, each man carbonizes 11 tons 7 cwt. 2 qrs. of coal per shift.

From the foregoing figures, it will be seen that the increased cost of manufacture during 1905 has been brought about by a decrease in the weight of coal carbonized. During the period of minimum make, there is not sufficient work to fully occupy the time of the two men, but too much for one man alone; hence the increased cost. The past two years have been very disappointing ones; for, when the new works were erected, the estimates were based upon an increased business being done, but bad trade, electric light competition, and suction-gas plants, have so far prevented those expectations from being realized. After this half year, there is every reason to expect that the business of the Company will again move upwards.

The following figures show the cost of the repairs and maintenance of the machinery over the past eighteen months:—

			Cost per ton.
Steam engines, coal breakers, elevators. Charging and drawing machine. Compressor and air-pipes. Inclusive of oil and waste.	Material, £64 12 2 Labour 43 14 0	£108 6 2	1·37
Coke conveyor, coke elevating and screening plant, inclusive of oil and waste.	Material, 88 10 7 Labour 105 10 6	194 1 1	2·46
		£302 7 3	3·83

The repairs needed to the charging and drawing machine are very slight; the heaviest items have been the result of accident. The upkeep of the machine caused by ordinary wear and tear is not, in the writer's opinion, more than that experienced with the use of hand tools, and would not, in a general way, exceed 0·75d. per ton of coal carbonized; and this amount at least should be deducted from the wear and tear of machinery when being compared with hand working. All the machinery is carefully examined each day, and, as far as possible, by the same mechanic. The time on this examination has run up the labour items; but it is a guarantee that no parts of the machinery are being neglected. The writer strongly advises all users of retort house plant, if they

wish to prevent mishaps and keep the wear and tear at a low figure, to insist upon a daily examination and inspection of all parts by a trustworthy mechanic, who should rectify any defects at once.

It is well known that the wear and tear of coke conveyors and elevators is more than any other part of the retort-house plant. The water which we use for cooling the coke is excessively hard; the deposit of lime preventing the turning of the pins, and causing extra wear and tear. This will be remedied to some extent in the future. The coke conveyor and elevator have been in continuous use for over two years, and will last for many years to come by simply renewing some of the wrought parts as they wear out. The additional cost on capital account for the coal plant, charging and drawing machinery, and coke plant was £4060. Interest on this sum, at 5 per cent. per annum, amounts to £304 10s. for the eighteen months, which equals 3·86d. per ton of coal carbonized.

The gas made during the eighteen months was—

	Cubic Feet.
June 30, 1904; to Jan. 4, 1906.	209,723,000
Average make per ton	11,101
Gas accounted for	200,909,000
Average per ton	10,635
Gas sold	198,685,000
Average per ton	10,517

It is impossible to give the cost of fuel in a detailed form for the different sections of the plant, as the steam for the whole of the works is produced in the same boiler or boilers.

Discussion.

The PRESIDENT said the members would agree with him that they had had a useful paper; and it remained for them to discuss it by bringing out the points and asking Mr. Lewis questions.

Mr. EDWARD ALLEN (Liverpool) said he had the honour of proposing a hearty vote of thanks to Mr. Lewis for the exceedingly interesting paper he had given them. The subject of stoking machinery was at present one of very great interest. Anyone, however, preparing a paper of this nature might almost feel inclined to say: "Well, surely, gas engineers are tiring of retort-house machinery." But the matter was one of pounds, shillings, and pence; and the old adage was still as true as ever, that "Dividends are made or lost in the retort-house." They had to thank Mr. Lewis for the clear way in which his paper had been prepared and delivered, and for the full and complete particulars afforded by him. They had also to compliment him upon being able to do a great deal of work with his two men. Some of the members had not been so successful as Mr. Lewis in this matter; but he (Mr. Allen) said, "Let every man do his level-best under his local circumstances." He (the speaker) should be the last man to find fault with an engineer who was able to do with two men what he had himself to have three men to accomplish. Respecting the machinery described, the work was good. The stoker was provided by Mr. West; and they knew what excellent workmanship was put into his productions, and with what great care any machinery of this sort was designed by him. It was also an important matter—and this Mr. West himself would acknowledge—that the machine should, after its installation, receive fair treatment; and from the record given by Mr. Lewis, the machine at Wellingborough had received such treatment. He was particularly struck by the wise remarks of Mr. Lewis as to constant inspection and the careful maintenance in good order of the machinery. He was quite sure that, in many cases, machines had been reported upon as defective, simply because they had been absolutely neglected. Regarding working costs, he was not certain the paper established that a system of stoking machinery was cheaper than one of inclined retorts. He (Mr. Allen), in saying this, did not wish to create any discord in the meeting. The President, however, had spoken of inclined retorts as being "out of the running." He could not agree with him; it was certainly not his experience. Of the various installations of carbonizing plant at Liverpool, he must say that, so far, the most economical method of working was that of the inclined system; and, working on the lines of eight-hour shifts, they found, from their recent experience, that they could deal with one kind of coal at a cost of 1s. 7d. per ton. Some of the figures given by Mr. Lewis were very satisfactory—15·9d. and 13·13d.; but, on the whole, it seemed to him there was nothing very much between the cost of eight-hour working at Liverpool and the two shifts in the twenty-four hours at Wellingborough. But this, again, was a question each man must settle for himself. He knew that inclined retorts had been unsatisfactory in some towns; but they had been working very satisfactorily with them at Liverpool. And when he told the members that they were making in mid-winter some 2½ (or rather more) million cubic feet of gas per day with inclined retorts only at one works, he thought it would be admitted the experience was not experimental, but was a thoroughly practical one.

Mr. B. W. SMITH (Walsall), in expressing his appreciation of the paper and in seconding the motion, said that really the most favourable circumstances under which Mr. Lewis was working made comparison rather difficult with older and larger works. As Mr. Allen had pointed out, the working with two men was a marvellous record for the amount of coal carbonized and the work done. He noticed Mr. Lewis had some difficulty in the working of his conveyor, especially in wear and tear. Perhaps he might be allowed to make a suggestion which he had himself adopted for some little time in connection with the working of a conveyor; and that was, to collect all the exhaust steam, condense it as much as possible, and collect the grease, and use it for the conveyor. "Grease it well," was his advice. He could add his high appreciation of work installed by the West Company. The West machine at Walsall had been working for four years; and the small number of parts he had had to obtain was ample illustration of good construction, and of the way in which the work was put together. He remembered when Mr. Morrison, of Sheffield, came to see him once on an entirely different subject, he said to him (Mr. Smith): "What a pity you put that splendid machinery in such a small retort-house. Why did you not pull down some of your plant, and make the retort-house bigger?" This clearly showed that the machine was capable of doing very much more work than he had for it to do there; so that it was only a matter of extending the retort-house, and giving the machinery sufficient work, to reduce the costs.

Mr. J. F. BELL (Derby) said that one thing Mr. Lewis had proved was that in small works (emphasizing what the President had pointed out in his address) it was now possible to introduce stoking machinery, and that its introduction would pay. Stoking machinery during the past few years had been greatly simplified, and its cost had been reduced. He used to be of opinion that it would not pay to introduce stoking machinery until a works had a make of about 150 million cubic feet of gas per annum. Now he would go so far as to say that in a works making 50 million cubic feet a year, it would pay to introduce stoking machinery. There was one thing that occurred to him. He noticed that steam-engines had been erected for working the conveyors; and he asked, "Why not put in gas-engines instead of steam?" They were introducing and pushing gas-engines among manufacturers; and they should therefore use gas-engines as far as possible on their own works. He knew that, in a number of gas-works, steam was now generated very economically. But still he thought that to practise what they preached was the best plan; and if they had gas-engines on their own works, it might lead to their introduction on other works. The author of the paper referred to the purchasing of coal-waggons. He did not think any gas-works could make a more profitable investment than the purchasing of coal-waggons. If anybody could make such waggons pay, it was a gas company. Mr. Lewis had been bold enough to go in for 20-ton waggons. Two years ago, he himself looked into this question, with the result that he was rather afraid to go in for 20-ton waggons; and he advised his Board to purchase 12-ton ones. They therefore bought fifty 12-ton waggons; and it had proved a profitable investment. The question of high capacity waggons was one that was now coming to the front; and he believed that 12 or 15 ton waggons would in future be the ones that would come into use. A 12-ton waggon had the same wheel-base as a 15-ton one; and they could be used much better than a larger wheel-base. He thought that the figures the author gave were very remarkable. His cost for removing the coal and breaking and elevating it was an extraordinarily low one. It is only 1·3d. per ton. That was exceptionally low; but as Mr. Lewis also pointed out, these new works had been designed so as to employ the minimum amount of labour. He was sorry he could not himself approach anything like these figures. He must congratulate Mr. Lewis on being able to get his coal out of the waggons and into store at 1·3d. per ton. Regarding coke, there was no doubt that, with mechanical handling, it was made smaller. They could not have mechanical appliances such as conveyors without breaking coke to some extent. But he agreed that the coke being somewhat smaller was no detriment—in fact, it made it of even size; and some people liked coke that had been dealt with by conveyors, because of the even size. On the question of allowance for repairs, depreciation, and interest, he saw that Mr. Lewis put down 5 per cent. He (Mr. Bell) thought he should allow 5 per cent. for interest, and then 5 or 10 per cent. for depreciation or renewals, especially with coke-conveyors. They should not take less than 15 per cent. for coke-conveyors and stoking machinery. Certainly he should not himself put down less than 10 per cent., because later on there was sure to be extensive renewals required. The cost of the coal plant, the charging and drawing machine, and the coke plant, was given as £4060. He (Mr. Bell) did not quite understand what this sum included. If it included the conveyor and stoking machinery, the overhead hoppers, and the air-compressor, it seemed to him a low sum. Perhaps Mr. Lewis would amplify his information on this point.

Mr. J. C. BELTON (Chester) said one of the most striking features of the paper was the remarkably small working cost at which Mr. Lewis was doing his work. He was to be congratulated upon living in a district in which apparently the labour unions left him alone. For twelve-hour work 5s. 6d. would, in his (Mr. Belton's) district, be considered a negligible quantity. If offered that rate of pay, the workmen would simply say, "Thank you for nothing," and walk off with their hands in their pockets, before they would take it. He was not anxious that Mr. Lewis should have the Union on his back; but in one place he had rather laid himself open to that by holding out a red rag to the Union by stating that the quantity of coal carbonized by each man per day was 11 tons 7 cwt. 2 qrs. It should be made clear that this was not the amount each man carbonized; but it was the amount that the machine dealt with, divided by the number

of men employed. If the men themselves had to do this quantity, Mr. Lewis would soon hear of it. As he had said, the low cost at which Mr. Lewis was doing the work was indeed remarkable. The heavy item of repairs and maintenance for the first eighteen months was not so good a figure as one would have expected. But they had been told that the heaviest items were the result of accident. The cost of the repairs and maintenance of the coke-conveyor was also heavy; and a different system of coke handling would result in greater cheapness in that direction. Everyone liked the bridge that carried him safely over the stream; and after 4½ years' experience with a coke gantry, crane, and hoppers, carrying the coke out of the retort-house by small waggons—this being the system he (Mr. Belton) preferred to a conveyor—he could say that the wear and tear on the plant was very slight indeed; and, where it could be introduced, it would be found more advantageous than a conveyor. It did the work expeditiously, and broke the coke less than a conveyor would. With regard to the number of engines employed, he should like to ask why Mr. Lewis used so many different systems of driving the machinery. They had duplicate steam-engines for driving the coal-breakers and elevators, compressed-air motor for driving the capstans, and then a steam-engine for driving the coke plant. It was not mentioned whether the breaker was operated by the same vertical steam-engine that drove the elevator and conveyor. Then it was stated that the coke, as it was drawn went, without the slightest difficulty, either direct into the furnaces for heating the retorts, or down the coke-shoots into the conveyor. If the first part of this statement referred to the outside retorts, then he congratulated Mr. Lewis. He (Mr. Belton) had not found an entire absence of difficulty in getting the coke from his outside retorts to the mouths of the furnaces. But perhaps Mr. Lewis's statement meant that only the two centre retorts of the setting were used for feeding the furnaces, which, if it was a single setting, might be the case. He would ask further what was the percentage of fuel consumed in the furnaces? Mr. Lewis also mentioned that the fine coke dust was employed for heating the boilers; but he did not tell them by what method the coke dust was used. Did he mix it with slack, or use a special furnace? This, of course, raised the point of how much coke per ton was sold from this system. He should take it that it was rather a high average, seeing that the breeze dust was used for the boilers. When one looked at the cost of carbonization, the conclusion must be come to that any comparison of these figures with other gas-works where different figures were in vogue was almost waste of time. It was so seldom that one was able to get together figures from different works upon identical bases; but certainly Mr. Lewis was to be warmly congratulated upon the very moderate amount of his carbonizing charges. It was evident where such results as these were obtainable, there was no demand for Chinese cheap labour. (Laughter.) The results reflected the highest credit upon Mr. Lewis.

Mr. George Helps (Nuneaton) said he rose not so much to discuss the paper as to put before the members a few figures relating to the cost with the De Brouwer projector which they had now at work. He noticed that Mr. Lewis said he charged every 4 hours 48 minutes. At Nuneaton, they charged every six hours. He did not think Mr. Lewis gave the charge per retort.

Mr. Lewis: 3¼ cwt.

Mr. Helps said the weight at Nuneaton was 3 to 3½ cwt. With the projector they had to use small coal; and before they had the De Brouwer machine, they put in 4 cwt. charges of screened coal. Mr. Lewis worked on twelve-hour shifts; but at Nuneaton they worked eight-hour. They had no coke-discharger. From March 25 last year to Jan. 22 this year, they carbonized 5897 tons of coal, which—including unloading, stocking and elevating—cost £54, which worked out to 2·2d. per ton. Regarding stokers—inclusive of charging, drawing, and removal of coke, furnace work, stopped pipes, holidays, and Sunday stoppage of work, and wheeling all ashes from the cellar, and preparing the luting for their old-fashioned lids—the cost came to £534, or 21·7d. per ton of coal—a total of 23·9d. per ton. Included in this sum was the boiler man and general foreman. Repairs he was unable to give; but he should reckon them at £25. The figures as he followed them in Mr. Lewis's paper as to the cost of manufacture—15·94d., 18·98d., 17·19d.—gave an average of 17·37d., which compared with his own figures of 23·9d. But then Mr. Lewis's repairs worked out to 3·83d.; and there were no repairs at Nuneaton. (Laughter.) The author also said that his men carbonized 11 tons 7 cwt. of coal; his own men did not do quite 4 tons. Regarding the capital charges at Wellingborough, they ran out to 3·8d. per ton. He offered these figures without comment. His works were only small ones; but if they were working up to their full capacity, the figures would be considerably reduced. There were places where these figures for projector working, without a discharger or coke-conveyor, would not compare altogether favourably. There were other cases, too, where the West machinery would do better.

Mr. W. Langford (Longton) remarked that Mr. Allen had been comparing Liverpool with Wellingborough; but he (the speaker) did not think the works were analogous, inasmuch as Mr. Lewis told them in the last part of his paper that in June, 1905, the cost per ton was 21·71d., while in January of the same year, it was, when they were carbonizing nearly double the quantity of coal, only 13·45d. per ton. This showed that had Mr. Lewis the proper capacity in his works for the utilization of the machinery to the full, he would in that case have brought down his carbonizing charges per ton to considerably less than 1s. Of this item note should be taken. He quite agreed with Mr. Lewis as to short-hour charges. He (Mr. Langford) was running on the same lines of five charges per 24 hours—about 3¼ cwt. per charge; and he was selling 11·3 cwt. of coke per ton of coal carbonized. Each man with the West manual stoking-machine was carbonizing 5 tons 10 cwt. of coal per day. Had Mr. Lewis's new works been double the capacity, he would have brought before the members a paper which would have shown conclusively that, in cheapness of carbonization, his works ranked with any in the country.

Mr. S. Glover (St. Helens): What does the man's work include who does the 5½ tons per shift, with West's manual stoking-machinery?

Mr. Langford: Each man does 34 charges per day of 3¼ cwt. per charge.

Mr. Glover: I took it for granted that he did the 5½ tons. What I want to know is, what other work does he do?

Mr. Langford: Nothing.

Mr. Belton: On the same lines, our men do 7 tons each.

Mr. John West (Manchester) said he should like to express his great thanks to Mr. Lewis for his kindness in bringing this paper before the meeting—especially as it was the first machine on these lines that he (Mr. West) had made. The object aimed at, in the design of the plant, was to do the whole of the work, as far as possible, by machinery. Of course, Mr. Lewis had a great advantage over many of the members in having, first of all, to find a piece of land suitable for the purposes of a gas-works to operate upon. This being found, he could then give full play to his talents; and his (Mr. West's) Company were also able to display theirs by helping, so far as their work went, in designing what they thought was best under the particular circumstances. There was nothing whatever to block the way; and there was something, from an engineer's point of view, in this. He thought Mr. Lewis had proved up to the hilt that they had made the best of the opportunities that were available. Mr. Lewis was very satisfied with the machine—in fact, he praised it very much. He (Mr. West) knew that Mr. Lewis had been satisfied with it all along; and he had before expressed himself to that effect. Mr. Lewis had the privilege of first using it; and, of course, he had also the privilege of being the first to have to contend with the untried mechanism. That was a privilege that most people knew was attended with some amount of trouble. He (Mr. West) claimed that this particular "horse" (if he might so describe it) was a thoroughbred. He thought that the horse was all right; but it appeared that he had not trained it fully up to the mark. When he sent him off, he was set to work; but he was certainly not handled by so good a jockey, at first, as he claimed to be himself. They had to educate the stokers up to the work. He must say that the stokers at Wellingborough took to the work very well indeed—better than most stokers he had seen; for they had worked marvellously well. The work was done in an admirable way, and was carried on with very great efficiency. Mr. Lewis would answer a great many of the questions that had been raised that day. There was, however, one point regarding the coke which seemed of the greatest importance. Mr. Lewis had given a statement of facts which were valuable; and he had not compared them with anything else. He said, however, that a large amount of the coke went direct from the retorts, by way of the coke-handling plant, into the railway waggons; and there must be a great saving in this over a system in which they put the coke down, picked it up again, and then carried it away to the trucks on the railway siding. Members who were using systems different from that of Mr. Lewis could compare his costs with their own. It was also said that the coke was small. It was always small when handled by mechanism, and especially when it was handled by an elevator. In this case, they had to take the coke by an elevator to a considerable height; and this without doubt had a tendency to break more than where one could get in a continuous inclined conveyor. Mr. Lewis had given them a number of figures referring to each of his three six months' working; but he would only refer to the table in which were given the figures relating to the working in January. He fancied Mr. Allen had not realized these figures to the extent that he would have to realize them. In the table, in dealing with the item of wages, Mr. Lewis had given everything—coal men, stokers, exhauster, boiler, and compressor men, and the general foreman of the yard. He put them all in. Therefore it was necessary that gas managers should be very careful when they were comparing their own accounts with these. Perhaps most of them should begin by comparing with the first two items only—that was to say, wages for coal and stokers (including all the matters mentioned by Mr. Lewis). In the first place, the coal wages, in January, amounted to 1·11d. Then next there were the stokers; and they worked out to 5·72d. These were the two figures which he had been aiming at; and not the other two items at all, which were universal, however the work was done. Mr. Lewis, however, thought it was best to give the members the whole of the figures. A short week's working experiment was made some time ago; and the result of that experimental working was, he (Mr. West) believed, practically the same as during the months of January and December following—the costs in these months were but slightly more. He understood, however, that Mr. Lewis, during the experiment, put in rather heavier coal charges. They put in

about 4 cwt. 10 lbs. per charge; while 364 lbs. was the average now, or 16¼ cwt. per mouthpiece per day. When Mr. Lewis could keep his men at work, he could get a very low carbonizing figure; and the engineers and managers of large works would have to take that figure, because they could (or most of them could) keep their men fully and properly employed. Coming next to the questions of bad trade, electricity, and suction gas, Mr. Lewis would have shown a better working result if he had had the increase that he had hoped to get. He (Mr. West) was, however, glad to say that Mr. Lewis's Company had got back the public lighting. This had upset the electricians; but as to suction gas, they must get the gas down as cheap as possible. It was the only way to meet the competition; and, if they did this, they would be able to do something in keeping out suction-gas plants. Wear and tear charges appeared very heavy; but Mr. Lewis gave a reason for it in connection with the charging and drawing machine. The wear and tear on the coke conveying and elevating plant, he told them, was very high. But he (Mr. West) wanted members to take particular note of this point: The corrosive effect of the water at the works was very bad, and, he might say, most exceptional. Mr. Lewis had had to put up plant specially for softening the water for his boilers. This water would eat away pins 1¼ inches thick very quickly. They had been working the coke plant two years; but some of the pins had had to be renewed, and this had all gone down to wear and tear. He (Mr. West) did not think it would take place again. They had similar pins working for double that period, doing eight times the amount of the work, and they would go on—well, he did not know how long. In giving the cost of wear and tear, the President had said that all the estimates should be made very broadly. There appeared to him (Mr. West) to be as much variance in this wear and tear business, as there was in the way gas engineers constructed their carbonizing accounts. In consequence, they could not dissect each other's working as they would like. If there could be a royal road to getting at this wear and tear, it would be very acceptable. At Sheffield, as the President had shown, they did the thing very completely indeed; but he (Mr. West) did not think it necessary, nor was it desirable, to allow 10 per cent. interest on capital when they could get money for 4 or 5 per cent. very easily.

The PRESIDENT: The capital at Sheffield was 10 per cent., and is so still.

Mr. WEST (proceeding) said that gas companies now generally paid 5 per cent. Then on top of this 10 per cent. interest, Sheffield allowed 10 per cent. for depreciation before ascertaining the saving effected by the stoking machinery installed at their works. He did not think this was fair to the machinery. He had a large number of figures in connection with carbonizing costs and the expense of wear and tear of machinery from many gas-works; and he knew about what the costs should be. But the only point he wanted to make in regard to this subject was a good comparison with Mr. Lewis's plant. It had reference to a model retort-house that was put up at the municipal gas-works at Copenhagen, under the Chief Engineer (Mr. Irminger). The house was started about two-and-one-third years ago; and it contained 20 beds of retorts, fitted up entirely with his (Mr. West's) machinery—with coal breakers, elevators, and hot-coke conveyors, and everything the same as Mr. Lewis had. A very strict account had been kept of the repairs. Those of the members who had seen these works and were acquainted with Mr. Irminger knew what a particular man he was. The plant there, though it had done so much more work than Mr. Lewis's, and had been in operation for the period he had mentioned, was in excellent condition; and the cost of repairs—taking the coal-breakers, compressors, all the stoking machinery, hot-coke conveyors, and everything the same as Mr. Lewis had—including oil and waste, only came to 2·99d. There was one thing Mr. Lewis had pointed out, which really ought to be put into Mr. Newbigging's "Handbook." That was the question of examining machinery and looking well after it. Engineers were beginning to be more alive to this. Something over a quarter of a century ago, he (Mr. West) was Chief Engineer to the Manchester Corporation; and at one of the works they had four large retort-houses all worked by machinery. The man who was responsible for that plant was the Deputy-Manager—and a very splendid fellow he was; the finest carbonizer, in fact, that he (Mr. West) had ever come across. But that man was not a mechanic; and he (Mr. West) deemed it advisable to appoint a mechanic, and place the whole of the machinery especially under his charge. The cost for repairs was soon reduced. What he (Mr. West) believed in was prevention. He knew in some of the largest works there was an inspection every day, and at a certain hour of the day, so that the engineer or manager could be there to see the inspection if he liked. Since this had been going on, the repairs had become less. There was no doubt whatever that inspection of machinery, and the keeping of it in good order, would be conducive to better work, and the saving of the cost of wear and tear. At one time, they kept the whole of the machinery at the Bradford Road works in repair for 5 per cent. on the total outlay. The Corporation had no workshops there at that time; but by the end of his five years they had put up shops, and had decided to do their own repairs. He did not make much out of it at that price; but what he did get was through keeping a man to inspect the plant, and so prevent break-downs, especially through carelessness on the part of the workmen.

Since the meeting, Mr. West has forwarded a letter which puts in very clear form several of the points he made in the course of his speech. Its publication will, we are sure, add to their interest. The letter reads:

It will be noticed that Mr. Lewis, no doubt to enhance the value of his paper, gave *all* the figures from his books—that is to say, those which immediately applied to the working of the stoking machinery, and some which did not, so that engineers could dissect and compare the figures with their own working. But unfortunately some of the members who discussed the paper appeared to take the total figures. I tried to separate them somewhat, but do not know if I succeeded.

In my opinion, it would have been better for the immediate sake of comparison if Mr. Lewis had given the cost of working the retort-house and the coke plant, apart from the other general outside charges. I pointed out that only the first two items should be taken, so that others could compare their retort labour against the total of these two items; and I tried to deal especially with the months during the employment of the two men per shift, when they were on full work, which, of course, would be a good example for those of larger works to compare with, where they could find full work for their men to do.

If you take the months of January and December, as I tried to explain, it works out as follows:—

Coal, inclusive of unloading, stocking, and elevating . .	1·11d.
Stokers, inclusive of charging, drawing, removal of the coke, and conveying the same into railway waggons on the railway siding, furnace work, stopped pipes, holidays, Sunday stoppages of work, &c. (labour) . . .	5·72
Total	6·83d.

In the former experiments, which were published in the "JOURNAL" some time ago, it will be found that the cost was given for this labour at 6·74d.; so that you see in practice it comes out practically the same. I am not aware of any figures which have ever equalled this before, especially when you take into consideration that it contains all the carbonizing, coke conveying, breaking, and delivering the same into waggons on the railway siding.

The figure that Mr. Brown, of Nottingham, gave at the meeting was 1s. 1d. for labour for working the compressed-air machinery, which is practically the same amount of work that is done at Wellingborough, when the two men are fully employed, for 6·83d. per ton; and I believe that at the present time the cost of working the compressed-air machinery at the Grimesthorpe works at Sheffield is about the same as at Nottingham.

A further point is as to the great advantages and saving of labour in connection with the coke being delivered direct into the coke-waggons on to the railway siding at the new works at Wellingborough. It will be seen that the cost on the works, apart from what is done by the machinery, is exceptionally small, and only amounts to £101 10s., or equal to 1·8d. per ton of coal carbonized, for the eighteen months. This item is charged to coke, but forms no part of the manufacturing charges. Therefore the saving through not having to take the coke off the ground, and get it into the railway trucks, must have represented a considerable sum besides the economy in carbonizing wages in the retort-house; and this is a saving that engineers can work out and appreciate better than I am able to do in comparison with their own works. It appears to me that the great value of this paper consists in the fact that the costs are taken over a long period, that there is no necessity for estimating or assuming anything, and that both engineers and managers of large and small works can readily make comparison between the figures given and their own working.

Mr. W. C. JONES (Brierley Hill) thanked Mr. Lewis for the careful manner in which he had given the statements of costs when using different quantities of coal. As Mr. West had pointed out, the low figures that Mr. Lewis gave would apply to the managers of large works; but to the managers of small works, where they were carbonizing only 6000 or 7000 tons of coal per annum, the larger figures would apply. This appeared to a certain extent to bear out the opinion he (Mr. Jones) came to three or four years ago when the question arose as to whether it would pay in his case to put in charging machinery. With hand labour, and only a manual drawing-machine, the figure for carbonizing wages approached the higher figures given in the paper where a charger was used. But in works of under 100 millions per annum, it did not, in his opinion, pay to put in any type of charging-machine at present on the market.

Mr. J. H. BROWN (Nottingham) said he had the pleasure the previous day of visiting and closely inspecting one of the retort-houses of the South Metropolitan Gas Company at the Old Kent Road. They had in use there, he thought it was, 16 beds of ten retorts, working with compressed-air machines and hydraulic pusher. There were two outside producers supplying gas to the whole of the house; and they removed the coke by waggons, drawn by an endless wire rope. He was very much struck with the great efficiency and completeness of the plant; but the figures supplied by Mr. Lewis that day appeared to give better results than those which he saw were being obtained at the Old Kent Road. All engineers who had stoking machinery were at present interested in three prominent methods of discharging and charging retorts—the De Brouwer type of machine, the compressed-air machinery, and inclined retorts. Their worthy President had told them the inclined retorts were out of the running; others said that compressed-air machines were out of the running; and some said that the De Brouwer machine was out of the running. It was all a matter of experience. He had sixteen beds of inclined retorts; sixteen beds working with the De Brouwer machinery; and thirty beds (shortly there would be forty beds) working with compressed-air machines. The compressed-air machines were erected twenty years or more ago—that was to say, the first machine. The same machines were at work, and had not been extended. Though there was very little of the original machine

left, still the same form remained; and it was working satisfactorily. The repairs and maintenance were naturally very high; and his last estimate was 4¾d. per ton for the charging and coke machinery. They found that, working under the best conditions with the compressed-air machinery, the cost was 1s. 1d. per ton of coal carbonized, including stokers, firing, and filling coke into the railway waggons on the works; but the final figure was something about 1s. 6¼d. per ton. With the De Brouwer projector and pusher, working on similar retorts, 14 in. by 21 in. by 18 ft. 6 in. long, and with sixteen beds, the cost ran out to 1s. 7d. But the chief difficulty was that they had to wheel out the coke in iron barrows; and if they had a coke-conveyor, the cost would be materially reduced. One great difficulty they had with the pushing machinery had reference to the class of coal they had to purchase, for financial reasons. The coke from Derbyshire coal had a tendency, when being pushed, to crumble and mount in the retorts. But it was impossible to adopt any other class of machine in that retort-house. In the case of the beds of inclined retorts, the total costs worked out to 1s. 5d. per ton, which was cheaper than the compressed-air or the electrical machinery. He, however, remembered very forcibly that the carbonizing results were not so satisfactory with the inclined retorts. They were making several hundred cubic feet of gas less per ton of coal than with the horizontals; but if they could improve their carbonizing results, as he had every reason to believe they would do, he did not see why the inclined retorts should not give almost as good results as the horizontal ones.

The PRESIDENT, in closing the discussion, said that fortunately the Presidential Address had a certain amount of licence about it; but, although apparently he had said a good deal in it that he ought not to have said [laughter], the members had taken it very kindly. But after all said and done, a Presidential Address was composed of matter reflecting the opinions of the man who wrote it; and naturally the opinions in his address did not tie any member whatever. They were all entitled to their own opinions, and particularly the President on the one occasion. As to Mr. Lewis's paper, he (the President) read the account that was published of his new works at Wellingborough; and he was very pleased indeed, on pressing Mr. Lewis afterwards to contribute a paper this year, when he said he would do so if it was wished. It was wished; and they had had the paper. The discussion showed that the paper had been extremely useful. Anything, in fact, in connection with retort-house work, if it was at all novel, or if it was good, was always very acceptable to gas engineers. When they came to look over the works at Wellingborough, saw a comparatively small works so completely equipped, and saw how easily it would be to extend them, and, when they remembered this was all the result of Mr. Lewis's fertile brain and engineering skill, no one who had seen could help praising. Mr. Lewis had laid out these works, and got the results at which some of the members had marvelled. He (Mr. Stevenson) always, when he had built a new works, wished immediately afterwards that he had to do it all over again, so that he could do something a bit better. These new works at Wellingborough, however, did strike him as being just about as good as they could be—that was to say, outside, because, of course, they could not see inside. But outside they were as good as they could possibly be.

Mr. LEWIS, in reply, said he had to thank the members for the kind and flattering way in which they had received his paper. The remarks that had been made were very favourable, and the criticism was not very difficult to deal with. He wanted the members to bear in mind one thing. There seemed to be a little doubt as to whether the working could be done in the way described. It was done; and the figures were actual ones for the whole period of eighteen months. Some surprise had been expressed at the quantity of work done by the two men on each shift; but it must be remembered that it was the arrangement of the plant, and the efficiency of the charging and drawing machine, that enabled the men to do the work. Up to a certain point in winter, they did provide them with a maximum amount of work; but in the summer it was a long way below what the men should do to justify the plant. The results, however, were so good that he had felt justified in having erected the plant, and in having put in this particular type of machinery. There was no difficulty with regard to the working of the coke-conveyor; and if he gave anyone that impression by what he had said in the paper, he was sorry, because there was no difficulty whatever. It worked with the greatest smoothness. With the exception of the wear caused by such a material as coke being dealt with, and the water being hard (containing lime in the forms of carbonate and sulphate of lime), the wear and tear was as little as it possibly could be on a conveyor. If the works were working to the full capacity, the repairs would be no more than they were on the small amount they were doing now. Inasmuch as the chain travelled the whole length of the house, the wear and tear would not be increased if it had to deal with double the present quantity of material. With regard to the use of gas-engines for driving the plant, he fully agreed with the criticism that had been offered; and if he were putting up the plant now, he should not put in steam-engines for either the coke or coal elevating. But as they had a steam-engine in connection with the plant at the old works, he thought it best to keep to steam; but he was perfectly satisfied, he should not put in steam-engines again for that purpose, owing to the great distance these engines were from the boilers, and the very large loss of fuel owing to condensation and radiation. With regard to interest, he thought the amount they ought to put upon plant of this kind was the interest they were actually paying upon the money which was raised to erect the plant. It seemed to him to be wrong to put upon plant a higher amount of interest than they had actually to pay. Nor was it necessary to pay 10 per cent. for depreciation and renewals. The proper plan was to keep the plant in a state of efficiency, and charge the actual amount needed for the purpose. The capital charge of £4060 included one coal-breaker and engine, ironwork for the pit, elevator, 60-ton coal-hopper, the charging and drawing machine, air-compressor and air-pipes in the retort-house, coke conveyor, elevator, screen, and hoppers, with the necessary steelwork for same. As to the question raised by Mr. Belton regarding labour unions, he did not know that he had laid himself out for the union to deal with; but, if he had, then he should hope that he would be able to deal with them when the time came. But the real point was that the way to deal with the men was to treat them in such a manner, and pay them such wages, as to make them perfectly satisfied; and he was bound to say that his men were perfectly contented. Mr. Belton, like some other members, had fallen into the error of thinking that the men did the work; but he would remind them again that it was the machine manipulated by the men. The men did not handle directly either the coal or the coke. He was quite aware of the system of coke-waggons and gantry that Mr. Belton had in use, as he himself had had coke-waggons in use for five or six years. However, he put up this coke-conveyor afterwards, feeling that the conveyor was a distinct advance upon waggons for their particular circumstances; and there was not much difference in the breakage of the coke. In their case, they did break the coke a little more. Unfortunately, they had to take the elevator at right angles to the conveyor path; so that the coke fell there, and that was where a good deal of the breaking took place. The coke-breaker was driven by the steam-engine actuating the elevating and conveying plant. As to the adoption of the compressed-air motor for driving the capstans, this was done because it was much handier than putting in steam. There was no difficulty, as already stated, in feeding the furnaces with fuel. Generally the two centre retorts were sufficient for the purpose; but there was no difficulty in putting the coke into the furnace from the side retorts. The coke dust formed only part of the fuel used at the boilers. It was mixed with coke, and burnt with the aid of Meldrum's blowers. Regarding the costs he had given, so far as he could see, they compared and held their own with any of the others that had been advanced by speakers that day. As had been pointed out by Mr. Langford, it was hardly fair to compare the average costs of eighteen months' working with the minimum costs of another system. Mr. West took exception to the form in which the costs of working had been given. He (Mr. Lewis) considered that it was absolutely necessary to know the costs for foremen and boiler and exhauster attendants; and what was needed, in his opinion, was that other engineers giving a statement of their working costs should include the same items as he had done. He thought it most misleading to give estimates of working costs based upon the maximum amount of work done; and if engineers would give the actual costs over twelve months' working, the uncertainty now in their minds, when comparing the working costs of one system with another, would disappear. So far he had not seen any figures of the working of other systems which excelled those he had brought before the members. Mr. West raised an important question about the saving effected by loading the greater part of the coke into the waggons direct. During the eighteen months before alluded to, they loaded between 6000 and 7000 tons of coke direct into the waggons without a penny being spent for labour.

ALTERATION OF RULES.

The next business was the consideration of the following alterations of rules as recommended by the Committee:—

(*a*) To alter Rule 1 to read: "That this Association shall consist of (1) Members, Engineers and Managers of Gas-Works in the service of Gas Companies or Corporations, and (2) Honorary Members, who have been members, retiring from active management, to be elected at the discretion of the Committee."

(*b*) To alter the last sentence of Rule 2 to read: "The ex-President of this Association and the President and Honorary Secretary, for the time being, of the Midland Junior Gas Engineering Association to be *ex-officio* members of the Committee."

(*c*) To alter the last sentence of Rule 9 to read: "The election of officers, and questions of a personal nature, to be decided by ballot."

The PRESIDENT, referring to the proposed alteration of Rule 1, said the Committee felt that some of their old friends who had been members, and who had given up the management of works, should not, in consequence, be disqualified for membership. They had remained members, but as an act of courtesy only, which, of course, at any time might be challenged. The Committee considered such gentlemen had a right to continue members; and therefore decided to recommend this alteration.

Mr. J. S. REEVES (Bilston), in seconding the motion, said he might instance their old friend Mr. William North, who had done yeoman service for the Association. The alteration would meet his case. The members would be quite safe in leaving in the

hands of the Committee the question of who should, or who should not, be honorary members.

The motion was unanimously carried.

Mr. BERRIDGE moved the alteration of Rule 2. He remarked that the Midland Junior Association, when formed, elected the President and Hon. Secretary of the senior Midland Association as members of their Committee. On their own part, the Committee of the Senior Association were anxious to have some connecting link between the senior and junior Associations, and so had decided to recommend the members to adopt this rule. It would only mean two juniors on a Committee of nine members. They wanted the connecting link, so that the junior organization might be part and parcel of their own.

The HON. SECRETARY said he had, as one who was responsible for the drafting of the rules of the Junior Association, much pleasure in seconding the resolution. The idea was that of the representation of the Senior Association on the Council of the Institution of Gas Engineers. They desired that the same idea should be carried out in connection with the formation of the Junior Association, by establishing a link connecting up the juniors with their own Association. In this way, they would reciprocate the confidence of the juniors.

Mr. JOHN WEST thought it the proper thing to do. He was connected with the Institution of Civil Engineers as well as the Students' Association in Manchester; and the Executive in London, he must say, did all they could to encourage the Manchester students.

There was some discussion as to whether honorary membership would not meet the case, or alternately whether it would not be sufficient if the President and not the Hon. Secretary of the Junior Association (who would be, as it were, a permanent member of the Committee so long as he continued in his office) was an *ex-officio* member of the Senior Committee.

However, the resolution as proposed by the Committee was adopted.

The HON. SECRETARY proposed the alteration of Rule 9, but pointed out that one difficulty that might arise from the election of officers by ballot would be the succession of the Vice-President to the presidency.

It was, however, generally agreed that there would be no difficulty on that score, and that the members would, as a matter of course, put the member they had previously elected to the vice-presidency into the higher office.

Mr. B. W. SMITH seconded the motion; and it was unanimously agreed to.

This concluded the proceedings; and the members afterwards dined together.

Commercial Sections of the Eastern Counties Association.

The preliminary meeting of the Western Section of the Eastern Counties Gas Managers' Association was held last Thursday, at Grantham, when the Committee and officers were appointed for the ensuing year. Mr. John Carter, of Lincoln, was unanimously elected Chairman, as were Messrs. Brown (Nottingham), Barton (Peterborough), and Ruggles (Leighton Buzzard) to form the Committee, with Mr. G. R. Casterton, of Melton Mowbray, as Secretary and Treasurer. The meeting was convened by circular, and was well attended. Rules were drawn up and passed; and the wish was expressed that, now that the Commercial Section is extending its operations, a larger number of members will participate in its benefits. The next meeting will be held at Grantham, on Thursday, the 22nd prox.; and it is hoped the muster of members will be a representative one of this section.

Manchester District Institution of Gas Engineers.

In the last number of the "JOURNAL" (p. 417), we indicated the nature of the business to come before the members of the Institution at the 36th annual meeting next Saturday. A feature of the introductory portion of the proceedings will, of course, be the presentation of the report of the Committee, reviewing the work of the past year. They open it with congratulations to the members on the continued prosperity of the Institution. The meetings during the year were exceptionally well attended, and the contributions by Messrs. Belton, Newbigging, and Watson—dealing respectively with street lighting, the price of gas to possible users of suction gas, and purification—gave rise to useful discussions. The consideration of a paper by Mr. Kendrick on "A New Purifier Grid and Purifying Materials" and the "Question-Box" answers had to stand over. The Commercial Sections at Manchester and Bradford continue to be successful. The Committee refer to the new departures made by the Institution last year by discussing the President's Address and admitting ladies to the autumn meeting, which was devoted entirely to pleasure. A step forward was taken at the November meeting by admitting as associate members the assistant-managers of the larger works. Further consideration has been given to the question of holding a gas exhibition in Manchester in the autumn of next year; and among other matters which have engaged attention are the expenses of the representatives of urban district councils when attending meetings and the institution of lectures. The membership roll shows an increase of four, and now numbers 147.

MIDLAND JUNIOR GAS ASSOCIATION.

Visit to Aldridge Colliery.

The programme of the Midland Junior Gas Engineering Association for their opening session included four visits. The first of these was to the Nechells Gas-Works of the Birmingham Corporation; and there, of course, the members were really in their element. The Mond Gas-Works at Tipton, which were the objective of the members on their second outing, constituted a slight departure from the "beaten track," and presented many instructive features; while the third visit of the Association, which took place on Saturday, was a still greater departure—it having been to the very home of the raw material from which their particular commodity is derived. It was to the pits of the Aldridge Colliery Company that the members proceeded; and not one of the fifty or so who took part in the expedition can have had cause to regard the time as having been otherwise than most profitably spent. The Hon. Secretary (Mr. James Hewett) is to be congratulated upon the varied character of the visits which he has so far been able to arrange; and the members will no doubt be perfectly justified in anticipating that the remaining outing of the present session will prove equally as pleasant and profitable as its predecessors.

As we have stated, the visit on Saturday was to the collieries and brickfields at Aldridge, near Walsall—the only spot in the neighbourhood at which gas coal is produced, and one which was easy of access at any rate to the majority of the members. The Company have two collieries, which are about 450 and 500 yards deep respectively; the weekly output being about 10,000 tons of gas, house, and furnace coal. The pits being dry, no pumping is required. On their arrival at the railway station, the large party were welcomed by Mr. J. B. Marryat, on behalf of the Company, in the regretted absence of the General Manager (Mr. W. F. Clark, J.P.); and a start was at once made for the nearest of the two collieries—the Leighswood—which was situated about a mile away. In addition to Mr. Marryat, the party were conducted by Mr. R. Underhill and Mr. C. Lester; and all three gentlemen were untiring in their efforts to furnish the visitors with the fullest possible information on every point. Being a Saturday afternoon, of course, the ordinary working operations were not being carried on; but this was an advantage in so far as it allowed the members to go just where they liked, and inspect closely the machinery which was set running for their benefit. Attention was first of all directed to the up-to-date tipplers, screens, and picking belts with which the colliery is equipped; but very soon came the event of the day—the descent of the pit, which was an entirely novel experience certainly to all but two or three of the members. However, there was—outwardly at least—no desire whatever on anyone's part to shirk the ordeal of the cage; and when Mr. Marryat genially asked how many were going to remain at the top, there was no response. Accordingly orders were given for the lighting of the necessary lamps, with one of which each person was provided, although this was not the sum total of the illumination, for the electric light is installed both above and below the surface. A move was then made to the pit, and the party were lowered (in batches of about fifteen) to the gas coal seam. The absence of any feeling of discomfort during the descent was a matter of general surprise. The sensation of falling lasted only a few seconds, after which everyone became firmly convinced that, instead of going down, the cage had changed its direction, and was being rapidly hauled to the top. Perhaps the ease of the journey was to some extent explained by the fact that the officials very kindly kept the winding machinery going at half-speed, though even this, judging by the lightning-like rapidity with which the corresponding empty cage flashed past, was very much more rapid than the travellers would otherwise have realized. When all had arrived at the seam to be explored—which, by the way, was not the lowest in the pit—there was a walk of about half-a-mile to the coal-face. For a great part of the distance it was possible to stand upright; but for a considerable time—varied according to the natural height of the walker—it was necessary to adopt a more or less doubled-up attitude. Next to the great heat experienced, the point about the expedition which most impressed itself was the extreme facility, even when furnished with a light, with which one can bring one's head into forcible contact with the timbering of the gallery. On the way back to the shaft, a visit was paid to the stables—the haulage being performed both by rope and by horses—and here fresh caution was necessary, owing to the lively movements of some of the numerous sleek little ponies installed there.

The top having been reached again, the party were conducted to the extensive brickworks of the Company, where they saw the machinery for the production of the red, brindled, and blue bricks, tiles, &c., of the "Leighswood" brand. The output of these bricks is very large; and a big order which has been placed with the Company is for the new Bristol Docks, at Avonmouth. After this the 30 feet diameter "Guibal" fan at the top of the Aldridge pit, which ventilates the whole of the colliery workings, and is kept running continuously night and day, was inspected, as well as the plant for washing the small coal to render it suitable for use in gas-producers.

At the conclusion of what had proved a most enjoyable and

instructive visit, a well-deserved vote of thanks to the Aldridge Colliery Company and the officials who had shown them round was heartily accorded by the members, on the proposition of Mr. F. J. Bywater, the President of the Association, seconded by Mr. B. W. Smith, of Walsall, who is an honorary member. The compliment was suitably acknowledged by Mr. Underhill.

MANCHESTER JUNIOR GAS ASSOCIATION.

Visit to Oldham Gas-Works.

About seventy members of this Association last Saturday paid a visit to the Hollinwood Gas-Works of the Oldham Corporation. They were met at the works by Mr. T. Duxbury, the Engineer, Mr. J. E. Dudley, the Manager of the Higginshaw works, and Mr. J. Taylor, the Manager of the Hollinwood works. Before proceeding with the inspection, Mr. Duxbury said he must apologize on behalf of his Chairman and Vice-Chairman for their unavoidable absence.

The productive capacity of the Hollinwood station is: Coal gas, 3,000,000 cubic feet per 24 hours, without the old No. 1 works; and carburetted water gas, 1,000,000 cubic feet. The storage capacity (four holders) is 2,200,000 feet. There are three retort-houses. The first contains fifteen through beds of threes, or 90 mouthpieces, direct fired. The second has ten through beds of sixes, or 120 mouthpieces, direct fired; and also eight through beds of eights, or 128 mouthpieces, on the regenerative system. The third house has twenty-four through beds of sixes, or 288 mouthpieces, direct fired. Up to the present winter, all of the retorts were direct fired. In the second house, ten direct fired settings, having a productive capacity of 450,000 cubic feet per 24 hours, have now been replaced by eight settings of regenerative furnaces, with stoking machinery, having a productive capacity of 900,000 cubic feet.

There are three coal-stores at this station; the total storage capacity being 9400 tons. The coal is delivered by carts into a hopper, which is fitted with machines for feeding the coal to a breaker, which crushes it to a size suitable for West's charging-machines. The coal is here elevated and delivered on to a band conveyer 2 feet wide, provided with a travelling carriage for throwing the coal off at any desired point in the stores. This plant is driven by a 34 brake-horse-power gas-engine, fixed in a house adjoining the breaker. The capacity of this plant is 30 tons of coal per hour.

The second retort-house will eventually contain sixteen through settings of retorts; but at present eight only are on the regenerative principle, with Waddell's patent tubes. There are eight retorts, 22 in. by 16 in. by 20 ft., in each setting; and instead of raising the retort-house roof, the coke-vault floor has been excavated to a depth of about 4 feet below the yard level. There is a separate hydraulic main to each setting of retorts, with the usual seal-valve, foul-main, tar-main, &c. In order to ensure a water dip in the hydraulic main, tar flushing towers have been fixed; and the whole of the tar is drawn off every two hours—viz., after each draw. All the retort work, including the ironwork and fittings, has been carried out by Messrs. R. Dempster and Sons, of Elland. The retorts are being worked by West's combined charging and drawing machines, with coal-elevating plant for filling the overhead supply hoppers in the retort-house, and hot-coke conveyors.

The coal plant for the retort-house consists of a bucket elevator and a band conveyor for carrying the coal across the retort-stack to the hopper on the opposite side. The elevator and steam-engine are shielded from the coal to be stored over the elevator boot; the coal feed to the same being regulated by an adjustable door. There are two overhead coal-hoppers in the retort-house, each capable of storing 10 tons. The West charging and drawing machines are provided with motors driven by compressed air for travelling along the retort-house and hoisting and adjusting the rakes and chargers, which are of the latest and most improved type; the latter depositing the coal evenly in the retorts at one operation. About $3\frac{1}{2}$ cwt. of coal is put in by each machine, or 7 cwt. per through retort, with the six-hour charges worked at the present time. The air-compressor and receiver are fixed in the exhauster-house; the air being conveyed through wrought-iron pipes which in the retort-house are connected to drums fixed overhead, and fitted with flexible tubes leading to the machines. These drums have automatic gear for winding the flexible tube as the machines travel along the retort-house. The air-compressor is of the latest type, with a steam-engine arranged tandem with the air-cylinders. An automatic speed regulator, operated by air pressure, is fitted to the compressor for slowing speed when the compressor is not required to be on full work; the air pressure needed being 60 to 70 lbs. per square inch.

The coke, when drawn from the retorts, falls down a shoot into West's improved hot-coke conveyor fixed below the stage floor; and each conveyor, on leaving the retort-house, rises up an incline to enable the coke to be delivered into a cross conveyor for filling the hoppers, which are fitted with outlets for supplying crane skips of an overhead Telpher coke-conveying and storing plant proposed to be erected. The coke-conveyors are driven by a horizontal steam-engine, and gearing of ample power for the conveyors when they are extended the whole length of the house. Provision is made for quenching the coke with canal water while in the conveyor-trough; and screens are fixed for abstracting some of the breeze and storing it in separate breeze-hoppers. The coke-conveyor chain is designed for the purpose of carrying as much coke as possible on it, to prevent the making of breeze. It is a simple construction, of great strength, and is provided with ample bearing surface; while the wearing parts are renewable at small cost. The conveyor-trough has a renewable cast-iron false bottom, which fits into the main trough.

There are two Lancashire boilers, both fitted with Wilton furnaces for burning coke breeze, &c. The new duplicate condensers are of Clapham's "Eclipse" water-tube type, each having a capacity of 1,500,000 cubic feet per 24 hours. Each condenser is divided vertically through its height by a central division-plate; the two sections thus formed being subdivided into three chambers—viz., a water-chamber at the top and bottom, with a gas-chamber between. Through the latter pass the water-tubes, which are $1\frac{7}{8}$ inches external diameter, and of which there are $1\frac{3}{4}$ miles in each condenser; the joints being made by Clapham's patent arrangement of stuffing-boxes and glands, which allows of the removal and replacement of any tube without disturbing the remainder. The gas flows through each section downwards, the water upwards, and in the reverse direction. Consequently, as the gas is cooled, it always comes into contact with the tubes containing colder water. The two vertical exhausters are of the Anderson type; and the capacity of each is 60,000 cubic feet per hour, or a total of some 2,750,000 feet per day. As this left no margin in case of breakdown, a new rotary exhauster has been erected, of Waller's patent four-blade "B" type, having an engine and exhauster direct coupled. This exhauster is capable of dealing with 150,000 cubic feet per hour at 65 revolutions per minute against 36 inches pressure on the outlet. The internal dimensions of the exhauster are 42 inches long by 42 inches diameter; four deliveries of gas being made per revolution, instead of two as in the ordinary Beale exhauster. A much steadier gauge is therefore obtained. The engine is of the horizontal high-pressure type, 12 inches in diameter by 18 inches stroke, designed for taking steam up to 100 lbs. pressure. The steam-regulator is arranged for regulating the engine with a vacuum up to 4 inches; and the regulating valve is of Waller's latest type, being of the equilibrium pattern.

The two scrubbers on the outlet of the exhauster are filled with coke; and the other eight are worked in pairs, and filled alternately with coke and wood grids.

A new Holmes horizontal washer-scrubber has just been added, capable of dealing with 3,000,000 cubic feet of gas per day, for the extraction of the ammonia. The non-metallic scrubbing of this machine equals 36,306 square feet; it being 20 feet long by 9 feet diameter, and having 24-inch connections. To the iron revolving plates are fixed circular brushes, which, in revolving, dip into the liquid in the lower portion of the several chambers, and supply the freshly-wetted surfaces through which the gas passes—breaking up the latter into minute streams and arresting the whole of the ammonia. Between the washing-chambers, and separating them one from another, are the patent still chambers, with a weir to regulate the overflow of the liquor from chamber to chamber. Clean water is used for this machine. The steam-engine has an 8-inch diameter cylinder, and 12-inch stroke.

There are eight ordinary water-lute purifiers, arranged in two sets of four. The larger set, 24 feet square by 4 feet deep, have recently been fitted with Jäger grids, and all oxide is used in this set. The four small purifiers are 16 feet square by 4 feet deep, and will at an early date be replaced by larger and more modern ones. The bottom layer is oxide, with a 4-inch layer of lime above. They are all worked three on and one off, with dry centre-valves. The station meters are two in number, made by Messrs. George Newton, of Oldham, and have each a capacity of 60,000 cubic feet per hour. There are four gasholders, three of which have been converted from two-lift telescopic to three lifts, each having a storage capacity of 600,000 cubic feet. One is rope-guided. The fourth holder, which has two lifts, has a storage capacity of 400,000 cubic feet. The total storage capacity being only 2,200,000 cubic feet, and the maximum gas delivered in one day having been 3,633,000 feet, the Committee have under consideration the erection of a new holder, having a capacity at least equal to that of the other four. The governors, of which there are four by Messrs. George Newton, are of the ordinary type; pressure being put on and taken off by weights.

The carburetted water-gas plant has a productive capacity of 1,000,000 cubic feet per day, with preparations left for another 500,000 feet set. The equipment of the engine-room is all in duplicate. There are two high-speed Tangye engines, each of 35 brake-horse-power, working at 300 revolutions per minute. Each engine drives a Sturtevant fan at 2000 revolutions per minute; one fan being capable of supplying air for all three sets. The two exhausters have each a capacity of 50,000 cubic feet per hour. There are two Lancashire boilers, each 24 ft. by 7 ft., working at 100 lbs. per square inch. The oil storage-tank has a capacity of 66,000 gallons. The whole of the plant has been erected by Messrs. S. Cutler and Sons, of Millwall.

There is also, in addition to these works, the Higginshaw station, and the central gas station, at which the store-rooms, pipe yards, and workshops are located, together with a coal-testing plant carbonizing about 350 tons of coal per annum.

The total productive capacity of all the works is 11,000,000

cubic feet, including 1,000,000 feet of carburetted water gas. The maximum gas delivery in 24 hours is 8,634,000 feet; and the gas-holder storage is 6,500,000 feet. The net price of gas is 2s. to 2s. 3d. per 1000 cubic feet; and the statutory illuminating power is 14 candles, although the actual quality supplied averages 18½ candles.

At the conclusion of the tour round the works, the members were conducted by special car to the new mess-room at the central works, where lunch was served. Mr. Harold Smith (ex-President of the Association) afterwards proposed a vote of thanks to Mr. Duxbury, Mr. Dudley, Mr. Taylor, and their assistants. He said that the members fully appreciated the kindness of Mr. Duxbury in conducting them over the works, and they were all greatly indebted to him. Mr. Duxbury, in replying, said that it had been a real pleasure to see the Association there; and they had looked forward to the visit quite as much as the members themselves.

Mr. A. Andrew, the General Manager, said, in supporting Mr. Duxbury, that ever since the Corporation took over the fixing of cookers free of charge they had more than held their own.

The members then proceeded to inspect a new experimental plant which had been erected at the central works; and this concluded the visit.

SMALL WATER SUPPLIES.

There was a full attendance of members of the Association of Engineers-in-Charge at St. Bride's Institute last Wednesday evening, when Mr. H. C. H. Shenton read a practical paper, accompanied by numerous diagrams, on "Small Water Supplies." The President of the Association (Mr. J. Patten Barber, M.Inst. C.E.) was in the chair; and after the reading of the paper, there was a lengthy and interesting discussion. Unfortunately, the space at disposal will not permit us to do more than indicate briefly the points dealt with by Mr. Shenton.

After mentioning the various sources of water supply, the water-bearing strata in South-East England were enumerated. These are the Norwich Crag and the Bagshot sand, above the London clay; beneath it the Oldhaven, Woolwich, and Reading beds and Thanet sand; and then the chalk, upper greensand, lower greensand, Tunbridge Wells sand, and Ashdown sand. The formation of the ground consists, roughly speaking, of layers of permeable or impermeable earth or rock, placed one above the other, so that each permeable layer is sandwiched between two impermeable layers. The latter are found in the following order: The London clay, gault, Wealden series (a little water is derived from sand beds which occur in this clay), Wadhurst clay, and Ashburnham beds. The chalk is the most important water-bearing stratum in England; and it is divided into three divisions. The upper chalk, which is soft and contains flints, is about 700 feet thick in West Sussex; the middle chalk, which is hard and contains very few flints, is about 200 feet thick; and the lower chalk, which consists of grey chalk and chalk marl, is about 160 to 200 feet thick, and is generally too impervious to yield any water, except where so shattered that the fissures let the water through from the more pervious chalk above. The position of the line of water-level in the chalk depends upon a number of conditions, such as the character of the chalk and the size and number of the fissures; for, of course it is only through fissures, and not through the body of the chalk, that the water can circulate. The only sure way in which one can come to any conclusion as to the probable depth at which water may be obtained, is to take observations as to the depth of the water in the nearest wells, and as to the levels of springs issuing in the adjoining valleys or on the sea shore. Wells in the chalk are generally unlined; the chalk being as a rule sufficiently hard to support itself. The lower greensand is also a very important water-bearing stratum. Although water can pass freely in all directions through the sand, however, it percolates, and does not pass through fissures as in the case of the chalk. In consequence of this, the springs in the lower greensand are not so large as those in the chalk. Where it is possible to sink a well into the lower greensand through a layer of clay, a very pure supply ought to be obtained; and wells in this formation are generally easily constructed. In the lower layers, where the sand is hard, it will sometimes support itself without lining during the excavation of the well, though it will probably be best to line it eventually. The lower greensand, being of coarser grain, is less likely to choke a bore tube than the Thanet or Wealden sands; and a boring has a better chance of success in this stratum, owing to the greater ease with which water can move through it. The Norwich Crag, though pervious, is not a good water-bearing strata, and wells are generally made through it to the chalk; while the Bagshot sand also, though it yields a good soft water, does so only in comparatively small quantities. The Oldhaven, Woolwich, and Reading beds and Thanet sand contain water which is sometimes irony in quality; and generally it is best to go deeper and obtain a supply from the chalk. Plenty of water of good quality is in places obtained from the upper greensand; but as water is also found in abundance in the chalk marl which comes immediately on the top of it, it is sometimes difficult to make sure from which stratum the supply obtained is derived. The Tunbridge Wells sand yields a water which contains much iron; but supplies comparatively free from iron are also obtained from it. In sinking wells, therefore, it is to a great extent a chance what the quality of the water may be. It is doubtful whether water can travel freely through this deposit for any great distance; and this, except where the sand is exposed to the surface, and so can easily gather water, it cannot be depended upon to give a large supply. Lastly, the Ashdown sand contains water of good quality; but it is too fine generally to yield a large supply from borings. Here, as in the chalk, therefore, sunk wells may likely succeed when borings would give a poor supply.

Having completed his enumeration of the water-bearing strata and their characteristics, Mr. Shenton turned his attention to well construction; and on this subject he had a lot of useful information to impart to his audience. He explained the various methods of sinking, according to the nature of the ground to be passed through. Shafts are, he thinks, generally to be preferred to borings for wells in this part of the country, inasmuch as they have a better chance of striking a good supply of water in the chalk, upper greensand, or the Wealden beds than a boring, which may miss the fissures, or get choked with sand, or fail to obtain a sufficient supply from sandy beds owing to the small area it touches. If a shaft in any of these formations fails to procure water in sufficient quantities, it is always possible to drive headings or adits, or sometimes the diameter of the well is enlarged considerably at the base, where the stratum is strong enough to allow of this being done. On the other hand, if a boring fails, little can be attempted. Borings are, however, he added, under certain circumstances, the best method of procuring water so far as economy is concerned. There are cases where the probability of reaching water with a boring is so good that it would perhaps be a mistake to waste money on a shaft; and there are also places where the shaft would have to be so extraordinarily deep that its cost would be out of all proportion to the value of the water when obtained. The author next made some remarks under the headings of adits, borings, and artesian wells. In conclusion, he impressed upon his hearers that deep well-sinking is a very serious matter, and should not be undertaken without its uncertainties being pointed out and the most careful geological study possible being previously made. "The number of failures of both deep and shallow wells," he said, "would make a very gloomy record if the instances were all collected and put together. Much money has been spent, and probably will be spent, in making wells which yield an insufficient supply." He urged that, while it is often best to go deep for a supply, expense and trouble might often be saved if the water near the surface were not overlooked.

Jubilee of the Coal-Tar Colour Industry.

The present year will witness the fiftieth anniversary of the production of the first artificial colouring matter from a product of coal tar, by Dr. Perkin, F.R.S.; and the event is to be celebrated in a manner calculated to do honour to the discoverer. It is proposed to place his portrait in the National Portrait Gallery, and a bust of him in the rooms of the Chemical Society at Burlington House. Preliminary meetings have been held under the auspices of the Society, and a Provisional Committee has been formed—who have prepared a scheme for submission to a public meeting at the Mansion House on the 26th inst., when the Lord Mayor has consented to take the chair. In addition to all the leading chemists and manufacturing chemists, the Committee already includes Lords Halsbury, Rayleigh, Alverstone, and Avebury, Lord Justice Fletcher Moulton, Mr. R. J. Friswell, F.I.C., F.C.S., and representatives of the Universities, the Royal Society, the City Companies, &c. It is understood that when the scheme has been formally adopted at the meeting, other countries, and especially Germany, the present headquarters of the chemical industry, will participate in the movement. The Secretary to the Committee is Professor A. G. Green, of the Leeds University.

The London and Southern District Junior Gas Association will hold a meeting next Friday, when Mr. W. A. Barnett, of Rotherhithe, is to read a paper on "Gas Exhausters." The occasion should be an interesting one for the members, as Mr. Barnett will exhibit some thirty diagrams, in addition to several models and sections.

In one of the "Political Notes" last Tuesday, "The Times" referred as follows to the change in the constitution of the Court of Referees and the Standing Orders Committee consequent upon the recent elections: "So many old parliamentary hands either retired voluntarily at the Dissolution or, in consequence of defeat at the polls or elevation to the peerage, are no longer entitled to sit in the House of Commons, that more gaps than usual have been created in tribunals such as the Court of Referees and the Standing Orders Committee, which, though nominated afresh at the commencement of every session, undergo very few changes of *personnel* from year to year. In this connection, the failure of Mr. Halsey to secure re-election is to be especially deplored; for he served many years as an indefatigable member of the Standing Orders Committee, and after the resignation of Sir J. Mowbray in 1898, held the dual chairmanship of that body and of the Committee of Selection. . . . Of the ten members who, with Sir Chandos Leigh, the Speaker's Counsel, constituted the Court of Referees last session, only three are now available for nomination—namely, Mr. Crombie, Mr. Brynmor Jones, and Mr. Paulton."

SOME COMPARISONS OF GAS AND ELECTRICITY.

Figures by Mr. F. W. Goodenough—Mr. A. C. Morton on the Lighting of the City.

With all the fighting qualities that are possessed by Mr. F. W. Goodenough, the Chief Inspector of the Gaslight and Coke Company, it was to be regretted that the "enemy" should have shown so unanimous a disposition to decline battle when, in accordance with promise, he last Tuesday evening opened a debate on "Gas *versus* Electricity" at the Bartholomew Club—whose meeting-place, by the way, is at the Saracen's Head Hotel, in the City. Ignorance of the fact that such a debate was to take place cannot be pleaded as the reason for this failure on the part of those interested in electricity to attempt, at any rate, to substantiate their claims before such an eminently suitable gathering as this—consisting of level-headed business men, who are keenly interested in questions of efficiency and economy both in their own and in public affairs. Letters were sent on behalf of the Club to the Electric Light Companies carrying on operations in the City, informing them of the debate; but none of them were officially represented at the meeting. In fact, Mr. Bailey, for the City of London Company, wrote a letter in the following terms (which was read out at the meeting) refusing to take part in the proceedings:

> I note that, in your proposed debate, the case for gas will be opened by Mr. Goodenough, the Chief Inspector of the Gaslight and Coke Company, and that he will be supported by several well-informed gentlemen in the gas world.
>
> I note in the last issue of the "Electrician," that this Mr. Goodenough secures the publication of a somewhat extraordinary letter; and as he apparently prefers abuse to argument, I am sorry that I am unable to meet him, and fear his views will not be of interest to those who prefer some proof of their accuracy, for apparently the gas people desire to avoid making any tests of the results of their lighting efforts, or even admitting that such tests can be successfully and accurately carried out.

However, electricity was not absolutely without a friend, in spite of this extraordinary shyness on the part of those most concerned with opinion on the subject in the City; and so members were enabled, to some extent at least, to hear both sides.

So far from indulging in "abuse," it was admitted on all sides that Mr. Goodenough put his case forward in the most temperate manner; but at the same time his facts and figures were so convincing that the audience—already apparently to a great extent in favour of gas—were obviously impressed with them. Before opening the debate, however, he made some reference to Mr. Bailey's letter. He remarked that a fortnight ago the "Electrician" published a statement that on a certain day photometric tests were taken of the gas-lamps in Fleet Street, and that as the whole of the mantles had been renewed on the previous day the tests would be of no value, as the mantles had had no chance to deteriorate. They therefore warned their readers against paying any attention to tests that might be published. He (Mr. Goodenough) therefore wrote a short letter informing the Editor that no tests of the lamps were made by his Company on that or any other date; and that on the day it was stated that the whole of the mantles were renewed, the Company's record showed that only four fresh mantles had been put on out of seventy burners. He further pointed out that a little while ago the electrical papers had similarly published the results of tests made by Mr. Frank Bailey, which in themselves proved their own absurdity; but that he had not noticed that the journals in question had then warned their readers against attaching too much importance to such tests. "Whether this can fairly be called abuse," he concluded, "I leave it for the meeting to judge."

After thanking the Club for the opportunity of bringing before them the case to be made out for gas, Mr. Goodenough proceeded to put forward this case in a full and very clear manner. He remarked that the question could be approached from two points of view—that of calculation from tested data, and that of the actual experience of users. Flat-flame burners might be left out of comparison, because anyone who still used these was employing something that cost him six times as much as need be for the light he obtained. Taking private lighting, he had based his figures on the cost of 1000-candle power for 1500 hours in the year, with gas at 2s. 11d. per 1000 cubic feet (the rate charged by the Gaslight and Coke Company) and electricity at 4d. per unit (this being about the average price in London for lighting). Electric glow lamps consumed 4 watts per candle power; and 1000-candle power for one hour would require 4 units. Multiplying this by 1500, gave 6000 units, which, at 4d., would cost £100. Adding the cost of renewals, which in the case of glow lamps might, he thought, be taken at 2s. each, they would arrive at a total of (say) £105. This was allowing nothing for deterioration, but assuming that the glow lamp continued to give its nominal power throughout, whereas, as everyone knew, it lost its efficiency as time went on. Now, compare with this a Welsbach burner consuming 4 cubic feet per hour. The maximum light that a mantle at ordinary pressure would give was 20 to 25 candles per cubic foot. He would take the average as 22 candles, and deduct from it 20 per cent., which would bring the lighting power down to 17 candles per foot. This assumed that, before the mantle was rejected, it might have run down to as little as 12 candles per foot, after starting at 22 candles. He had had tests made of mantles which showed only a decrease of 10 per cent. after burning 1090 hours. At the end of this period, they gave a light of 21·6 candles per foot. It would require 15 burners consuming 4 feet of gas per hour to give 1000 candles (it would really be 1020 candles, taking the average figure of 17 candles per foot); and this 60 feet per hour for 1500 hours would amount to 90,000 cubic feet, which, at 2s. 11d., would cost £13 2s. 6d. But in order to put the incandescent mantle as far as possible on a par with the glow lamp, it was necessary to provide a bye-pass; and it had been found that a bye-pass for an ordinary incandescent burner consumed about $\frac{1}{8}$ cubic foot per hour. He would take it at $\frac{1}{4}$ foot, which would be about 4 feet per hour for 15 burners, and would amount, for the 7260 hours per annum during which the lamps would be out of use, to 29,000 cubic feet, costing £4 4s. 6d. Mantle renewals he put at 3s. each for the 15 burners, or £2 5s.; and thus he arrived at a total of £19 12s., or say £20, compared with £105 for electric glow lamps. He had fully depreciated the lighting value of the gas mantles, but had not depreciated the power of the electric lamps. Then one had to take into consideration the Nernst lamp. This was estimated by its makers to consume, according to voltage, from 1·4 to 1·7 watts per candle power; and taking the average of 1·5 watts, would give a total consumption of 2250 units for 1000-candle power for 1500 hours. This at 4d. per unit would work out to £37 10s., in addition to which there was the considerable item of lamp renewals. A lamp renewal cost a shade over 2s.; and reckoning that the lamp had to be renewed four times a year, they arrived at a charge of (say) £7 10s. under this head—giving a total of £45. It had been publicly stated by Mr. Fedden, of Sheffield, that, with a lamp which claimed to give 30 to 32 candle power he could only get 15 candles; and with a "D" lamp, for which 70-candle power was claimed, he obtained not more than 30 candles. If, therefore, he (Mr. Goodenough) took 2 watts per candle power for the Nernst lamp—which he was sure was only fair—it worked out to a total of £57 10s., against £20 for gas. Then, of course, electricians had arc lamps; and if large units of light were required, the gas companies had self-intensified gas-lights. The latter gave from 20 to 30 candle power per cubic foot; and 24 candles would be a very fair average. Thus 1000-candle power for 1500 hours would require 63,000 cubic feet of gas, which, at 2s. 11d., would cost £9 3s. 9d.; and taking the cost of maintenance (two lamps at 12s. each) at £1 4s., they arrived at a total of £10 7s. 9d. Then there were also high-pressure gas-lamps. The maximum candle power he had ever read of with a high-pressure gas-lamp was 41 candles per cubic foot; but he would take 30 candles, so as to allow for the slight cost of running a gas-compressor. The consumption thus required to secure 1000-candle power for 1500 hours would be 50,000 cubic feet, costing, at 2s. 11d., £7 5s. 10d.; and maintenance (say, three burners at 6s.) 18s., would give a total of £8 3s. 10d. Compare this with arc lighting. A 10-ampere arc lamp would be called a 2000-candle lamp; but tests carried out at the Westminster Testing Laboratory gave the efficiency of such a lamp as 633-candle power, and the consumption as 0·753 watt per candle power. This, of course, was a lamp tested under the best conditions. He would take 0·8 watt as the normal, which would require 12,000 units for 1000-candle power for 1500 hours. This would cost £20; and the carbon renewals and labour might be put at £4, making a total of £24. This, he would point out, was with open arc lamps; closed arcs would cost 50 per cent. more. Then there was the flame arc, which was just now very much in evidence in certain streets. Some tests at the Westminster Laboratory showed the very considerably better efficiency of $\frac{1}{3}$ watt per candle power; and on this basis, it would require 500 units, costing £8 6s. 8d. Carbon renewals were more expensive than for ordinary arc lamps; and they might be put at £4 3s. 4d., making a total of £12 10s. per annum. Of course, the cost of installation with electric lighting was always greater than with gas.

On the point of practical experience, Mr. Goodenough said he could best summarize this by telling the members that his Company had up to the present time completely superseded the electric light by gas in 700 premises, and had done so partially in 1038 cases. He next quoted letters from customers showing the great saving secured by removing the electric light and installing gas, and then referred to the incandescent gas lighting at Victoria Railway Station, which has been such a pronounced success, both from the point of view of efficiency and economy. He also had much to say on the question of public lighting—remarking that in London there had unfortunately been a considerable amount of difficulty in fighting this matter, owing to the fact that the lighting of the streets was in many cases in the hands of the people who supplied electricity. Citing the case of Islington, he pointed out that the lighting of 20 miles of streets by electricity cost £5200 per quarter, against £4000 for lighting 100 miles by gas. This was exactly 6 to 1, taking the cost per street-mile; and no one would say that the streets illuminated by arc lamps were lighted even twice as well as those using gas—to say nothing of six times. It was also mentioned that the cost of public lighting, which in 1889 was 1·5d. in the pound, had in 1905 risen to 4·58d.; and yet the municipal undertaking was not making anything like a profit which compensated for this enormously increased outlay. Mr. Goodenough next pointed out the great advantages of having an even, shadowless light over

large areas, and the greater ability of gas than electric arc lamps to fulfil these requirements, in addition to their much lower cost; and he did not, of course, neglect to lay emphasis on the greatly superior penetrating powers of gas in times of fog. He drew attention to the fact that the principal thoroughfares in Paris, Berlin, and Vienna, were infinitely better lighted than Pall Mall, Regent Street, or the Strand, because the former were illuminated by a large number of medium power gas-lamps, near together, and at a moderate height above the pavement, while the latter were lighted by a much smaller number of electric arc lamps, necessarily much farther apart, and placed high above the area to be lighted. There was, Mr. Goodenough said, no prettier street lighting sight in Europe than the Ring Strasse in Vienna; and there one found several rows of single-burner incandescent gas-lamps giving a perfect diffusion of light. He also referred to the stated intention of Liverpool and Bradford not to extend electric street lighting, though in the former case the Corporation owned their electricity works and had to buy gas from a Company. The disadvantages of "skying" public lights, as is done with electric arc lamps, was dealt with at length. On the subject of power, he quoted the testimony of consumers who had replaced electric motors by gas-engines, to show that the latter were the cheaper. Coming to heating, Mr. Goodenough was able to drive home his argument by means of a very amusing anecdote. He said that in passing an electric light company's showroom, he had noticed the attendant sitting on an electric radiator, which was at the time alight; and he remarked that the man would probably not care to sit long on a gas-stove that was burning a pennyworth of gas per hour. The health aspect was, of course, not neglected; the opinion of Dr. Aiken in the "British Medical Journal" being quoted, to the effect that by using gas in a public hall there was created a constant movement of air upwards, carrying with it the exhalations of those who were in the building. Mr. Goodenough concluded his able argument by referring to Professor Frankland's report, some time since, in favour of gas for the lighting of the Birmingham Art Gallery.

The Chairman (Mr. Carl Hentschel) complimented Mr. Goodenough on the very temperate tone of his criticism—especially in view of the letter which he had read from the City of London Electric Lighting Company. He was sorry that an official of an Electric Lighting Company should write such a letter. He (the Chairman) was one of those who had employed gas to make his electric light, so that he was a user of both. Mr. Goodenough had made out a very strong case in favour of gas for public lighting; but with regard to its effect on decorations in private houses—particularly silks—his experience was that gas did seriously affect them, under whatever conditions it was used.

The discussion was then taken up by Mr. Ridley on behalf of the electrical industry. He began by referring to a report issued some two years ago by the Borough Surveyor or Engineer of the City of Westminster. In it, he stated (taking the best results in both cases) that the total average cost of electric arcs at Hyde Park Corner averaged per candle power per annum 8·7d.; and there the arc lamps were charged out at £22, which was higher than recently quoted. Against this 8·7d. for electric arc lighting, the cost of the Sugg lamps in Whitehall was given at 10·3d. Since this report was written, flame arc lamps had become quite common objects; and he believed it was admitted, even by gas people, that they were at least twice as efficient in candle power per unit as the other arcs. If so, and assuming that high-pressure gas lighting had not meanwhile been improved, the figures would be 4·4d. for electricity as against 10·3d. for gas. He could not personally support these figures, but merely quoted them as a view from the other side. In mentioning flame arc lamps, Mr. Goodenough stated one thing which until recently was very generally believed to be a fact—that the cost of carbons, &c., was higher than with ordinary arcs. But there was a lamp now made, and put on the market, the cost of carbons for which was no higher and the attendance was considerably less. The lamp would burn for fifty hours without any attention. With regard to the public lighting of the City, Mr. Goodenough quoted modern gas against electric lighting; but he did not mention that it was very ancient electric lighting. They had the same electric lamps up then that they had twenty years ago, to compare with modern gas-lamps. For fog penetration, he thought the flame arc lamp would hold its own against any gas-lamp. With regard to comparative cost, Mr. Goodenough's Company printed on their gas bills that gas at 2s. 11d. per 1000 feet was equal to electricity at ½d. per unit. Mr. Goodenough took 4d. per unit for his comparison; and he stated that the cost of high-pressure gas was £8, as against £12 10s. for flame arcs. If the price of electricity was reduced to ½d., he thought that the figures would be considerably in favour of the flame arcs. [Mr. Goodenough admitted that with flame arc lamps, at ½d. per unit, electricity would be cheapest.] As to power, a gas paper had stated that at the Wavertree works of the Liverpool Gas Company electric motors were used to drive the conveyors. Then with regard to heating, he did not think anyone would advocate electric heating all round. The Gaslight and Coke Company had sent out a circular on this subject which was perfectly scientific and perfectly fair. At the same time, Mr. Goodenough might say that if one had an efficient anthracite stove in the middle of the room, it might be ten to one in favour of the coal; but no one would deny that the convenience of gas made it worth the extra money. The same thing applied to electricity. Cleanliness had always been the great point with electric lighting people. There was a great deal to be said on the subject of the deterioration of decorations in delicate colours by gas; while food kept better in shops when electricity was used. Taking the neighbourhood of Ludgate Hill, he should say that 98 per cent. of the shopkeepers had gone over to the electric light; and were these people so foolish as to pay six times as much for their lighting as would be the case if they adopted incandescent gas-burners?

Some highly interesting remarks in regard to the lighting of the City were made by Mr. A. C. Morton, M.P., who commenced by remarking that the letter written by the City of London Electric Lighting Company was most unfortunate, though it to some extent showed the spirit in which the Company had acted with regard to the City Corporation. He did not think the electric light people had any reason to complain about gas men looking after their own interests, because if there had been any interference with anybody, it had been the electric lighting companies who had interfered with the gas people. It was not so long ago that he (Mr. Morton) was much more active in getting electric light into the City than in troubling about gas. This was mainly because it was found that the citizens were very much overcharged, and the only way to get reasonable treatment was by competition. By this means they reduced the price, with a total saving to the citizens of many hundred thousand pounds. But these considerations had not prevented them from trying to get the best light under all circumstances. His attention was particularly called to the lighting of the streets some five years ago. At that time they had had electric arc lamps for a number of years in the main streets; but they were not satisfied with them. No one believed they obtained the 2000-candle power which they bargained for; and they were unable to get anything done with regard to the side streets, which were very badly lighted. The South Metropolitan Gas Company had then just introduced into the streets on the south side of London incandescent lamps in place of the old flat-flame burners; and they happened to place one of these lamps opposite his house. So far as he could judge, the lamp gave at least four or five times as much light as the old ones. The two speeches which the members had heard that night would show them the difficulty of supporting any contention by means of any sort of tests. He had had a great deal to do with the testing of lights; and he came to the conclusion that it was not of much value. The real test was to go and see the light for oneself. The result of his observations of the common incandescent lamp, had been to get the whole of the side streets and courts of the City lighted on the same system; and he defied any citizen to say that they were not much better lighted than they were before. It was only necessary to ask the police, who would say that they could see up the courts now without walking through them, in a manner that they could not do before. The side-street lighting having been so satisfactory, attention was turned to the main streets, because everyone complained that the light there was not so good as it ought to be; and complaints were also made as to the excessive cost, which was a great deal more than they used to pay for the whole of the lighting. Therefore they had tested to some considerable extent already what could be done for the main streets; and as far as he had any knowledge, and could get any information from anyone, the lighting in Fleet Street—which was not under pressure, because they were trying two or three different sorts of lighting—in Queen Victoria Street, and Monument Street, and part of Lower Thames Street, was very much better than before, at a much less cost. Here, again, the police said they were very much more satisfied with the lighting now than they were before; and the people who had to do their business at Billingsgate in the night time stated that they could now see very nearly as well as if it were daylight. Therefore, as far as experience went, they were thoroughly satisfied with the new light, whether under pressure or not, as compared with the old. Of course, there were great improvements. Now as to the economy in cost. They were in some cases getting gas under pressure from the Company. This saved trouble; and not only was a better light obtained, but there were fewer accidents in the shape of the lamps going out. No doubt in time the Gas Company would be able to supply gas under pressure all over the City, without the consumers having to go to the expense and trouble of providing a machine to put the gas under pressure themselves. Then he had induced the Bridge House Committee, who had charge of the four City bridges, to relight them on the incandescent system; and again he said: "Go and see for yourselves; and there is not a single person who will not admit that the light is all that is required, and is at least quadrupled." He had had some tests made; and he came to the conclusion that there was no need to trouble about them, because they were all laboratory tests really, and could not be fairly made out of doors, and the consequence was that one got in a muddle. The only safe way to form an opinion with reference to lighting was to go and see it. After seeing the lighting in Paris, he had concluded that over here it was the custom to put the lamps too high; and since then the side-street lamps in the City had been put a foot or two lower, with the result that the difference in lighting was extraordinary. Inquiries in Brussels and Berlin confirmed his opinion that, so far as street lighting was concerned, up to the present moment the incandescent light, whether under pressure or not, was the best obtainable. All agreed with this, except those who were more intimately concerned with the production of electricity. As to inside lighting, he found that in his own house with inverted burners it was possible to get a much better light than with electricity. But, of

course, electricity had its uses, and he would be sorry to do away with it altogether. He did not think the flame arc lamps were at all satisfactory, as the glare of them would be dangerous in the streets. The gas-lamps fitted up at the Mansion House were much better. It could not be said in the City of London that the Electric Company had ever done anything to improve the lighting. The lights were put up fifteen or sixteen years ago; and the Company might have altered them if they had liked, at their own expense, because the Corporation had an inclusive price. But until this agitation took place, nothing was done. They had heard comparisons made based on the charge of the Gaslight and Coke Company, which for private lighting was 2s. 11d. per 1000 cubic feet; but if similar calculations were made with regard to the South of London, they would, of course, be still more in favour of gas. What they would like would be to have gas on the north side of the river as cheap as it was on the south, allowing for the difference in quality.

Other gentlemen who contributed to the debate were Mr. Thomas (who ably criticized the notorious Battersea municipal electricity undertaking) and Mr. Morriss. Mr. Goodenough replied at length to the speeches that had been made; and, in the course of his remarks, he explained the reason why gas was dearer on one side of the river than the other. In the first place, the Gaslight and Coke Company charged no meter-rents, while the South Metropolitan Company did; and this was equivalent to 1d. per 1000 feet. Then rates were heavier in the North—nearly 2d. per 1000 feet more than the South Metropolitan Company paid. Of the Gaslight and Coke Company's price, 3½d. per 1000 feet was entirely made up of local rates; and one of the reasons for these heavy rates was that so many of the boroughs in their district had gone in for electric light undertakings, and had spent large sums on street lighting. Another reason was the heavy capital account, which was, to a very considerable extent, due to the fact that the Company were compelled to take their works from London right down the river. The statement that gas at 2s. 11d. per 1000 cubic feet was equal to electricity at ½d. per unit referred to a comparison between ordinary incandescent gas lighting and electric glow lamps.

The proceedings concluded with hearty votes of thanks to Mr. Goodenough for his paper and to the Chairman for presiding.

Preparing for the Engineering Profession.

The Society of Engineers held their first ordinary meeting for the present year on Monday, the 4th inst., Mr. Maurice Wilson, the new President, delivered his Inaugural Address, in the course of which he made some pertinent remarks on the above subject. He reminded the members that he had for a number of years been engaged in the early education of engineers, and expressed his opinions as to the training of youths preparatory to their engineering education. He stated that a boy during the latter part of his school life should be prepared, as far as possible, in the direction that would be most likely to benefit him in after life. He was certain that, at any rate, in reference to engineering, this was not done in the majority of cases. Pointing out that it was fair to take the average boy as an example, he asked how a boy at one of our public schools was taught mathematics. A boy was not likely to become a good mathematician unless he learnt to follow up with intelligence the various stages of his mathematical training. Many youths began an engineering education without having taken any interest whatever in mathematics at school. He then referred to the bad spelling and execrable handwriting of the youth of the present day, and was emphatic as to the desirability of boys being refused admission to public schools unless they had been properly taught these subjects elsewhere. Taking it broadly, it was not the boy from the large public school, but rather the one from a small public, or from a private, school, who was a reasonable being. The general effect of this state of things was that, on leaving school, a youth usually found himself so wofully ignorant, that he was obliged to spend a considerable time in working up all those necessary matters for his engineering education which he ought to have learnt at school, and that without any reference to higher mathematics. The President added that the Institution of Civil Engineers were moving in the matter; and as theirs was the opinion most likely to carry weight, they should be cordially supported by all engineers.

In the list of associate-members of the Institution of Civil Engineers elected at the last monthly ballot, was the name of Mr. Humphrey Noel Giles, B.Sc., of the Liverpool Corporation Water-Works, Oswestry.

Mr. A. Duncanson, formerly the Water Engineer of the Liverpool Corporation, whose death, at the advanced age of 86, was announced in the "JOURNAL" for the 30th ult., left estate of the gross value of £8372, with net personalty sworn at £8313.

We have received from George Newnes, Limited, Part XII. of the "Technological and Scientific Dictionary" now in course of publication by them, under the editorship of Mr. G. F. Goodchild, B.A., and Mr. C. F. Tweney. It extends from "spring balance" to "tides," and consequently includes "sulphocyanates," "sulphur compounds," "tantalum," "tar," "terpenes," "thermochemistry," and "thorium." The part is of unusual interest. The issue of the next will complete this useful dictionary.

AMERICAN COMMERCIAL GAS ASSOCIATION.

First Annual Meeting in New York.

The First Annual Meeting of the above Association—an organization which was initiated some months ago, under circumstances and with objects with which our readers are doubtless familiar—was held in the Cadillac Hotel, New York, on Jan. 24 and 25. Mr. W. J. CLARK, the Superintendent of the Fuel and Appliance Department of the Consolidated Gas Company of New York, the President, occupied the chair. There was a very good attendance of members—59 representatives of gas companies, and 71 of manufacturers.

The PRESIDENT opened the proceedings by explaining that the meeting had been convened pursuant to a call of the Committee. He added that a large number of applications for membership had come in since the last regular meeting. They had been approved by the Board of Directors; and he suggested that they should be elected.

A motion to this effect was put and carried.

The SECRETARY (Mr. L. S. Bigelow, of New York) read the minutes of the last meeting; and they were approved.

The constitution and bye-laws of the Association, as presented in a pamphlet, were next adopted; the only change made being in the date of the meeting, which was fixed for the fourth Wednesday in January. Under the rules, all who are admitted to the Association are active members, and are entitled to take part in the discussions and proceedings.

The reports of the Board of Directors and the Secretary-Treasurer were then submitted. The latter showed that up to Jan. 22 there had been paid $725 in respect of 145 memberships, and that there was a sum of $200 due in respect of 40 others; making $925. The total expenses up to date had been $288; so that there was a balance of $437. These reports, as well as that of the Finance Committee, were adopted.

The next business was the reception of the report of the Committee on Nominations, which contained the following list of office-bearers:—

President.—Mr. W. J. Clark, of New York.

Vice-President.—Mr. C. E. Learned, of Meriden.

Directors.—Messrs. W. H. Allen, H. L. Barnes, A. A. Burr, J. D. C. Clark, and C. E. Ummach, for one year; and Messrs. D. T. Cortis, E. C. Dillon, G. W. Clabaugh, R. M. Searle, — Vernon, and G. H. Scranton, for two years.

The report was accepted, and the Committee's nominees were declared duly elected.

The PRESIDENT then delivered his Inaugural Address. He began by stating that since it was proposed to organize an Association of commercial gas men—and by commercial gas men they meant any person qualified to assist in furthering the objects of the Association by the promotion of increased sales of gas, and the promulgation of ways, means, and methods necessary thereto—the question had been asked: Is there any good and sufficient reason, in the face of the existence of the several Gaslight Associations, for a new organization? Was there room for it? What work could it accomplish which could not be done as well, if not better, by the existing Associations? To give an answer to these questions, it was necessary to review briefly the work done by these Associations, to look into the status of the commercial gas man as a member of them, and find out what there was in the work they accomplished which would interest him. Mr. Clark then proceeded as follows.

I hold that the object in view in joining an association is, or should be, first of all the holding of conferences on subjects in which all the members may take part; and this means that the applicant for membership feels that desirable information is more easily obtained by joining an organization than by individual work outside of it—that is to say, the first object is conference on subjects which will result in mutual benefit. It therefore goes without saying that the subjects which are discussed must interest the several elements of which the Association is made up. Following out old lines, the Gaslight Associations did this, for the reason that, as originally constituted, they were almost exclusively made up of gas manufacturers, who naturally had only the engineering and technical problems to solve; and their efforts were all along these lines.

The conditions of the gas industry have changed; but apparently the Gaslight Associations have not. A new factor has developed in the industry—and it is conceded that it is an important one—viz., the commercial gas man, in the form of manufacturer, buyer, and seller of gas appliances. This commercial man is becoming more largely interested in the Associations each year; but, as a rule, he is relegated to an inactive or associate membership, with the result that he takes practically no part in the proceedings, and hears little to interest him at the meetings.

A review of the programmes of the papers read and the subjects brought forward at the meetings of these Associations shows that the matters discussed were almost exclusively on engineering and technical problems. This must not be understood as being spoken in the spirit of disparagement of the work done by the

Associations, but rather to show that, according to the voluntary admissions of some of the most earnest workers in them, it is impossible for them to take up the commercial problems. I am quoting one high in authority when I say: "The solving of engineering and technical problems is so large a part of their work as to almost positively preclude the possibility of their taking up any of the commercial problems of the gas industry."

Now, as this is admitted, by those in official positions in the Associations, to be the existing condition of things, and the prospect of there being any material change being rather a remote one, the necessity for such an organization as the National Commercial Gas Association becomes apparent; and it is emphasized by the recent marked accession to the Associations of men who are looking for information pertaining to the industry other than that of a purely technical or engineering nature. Up to this time, his experience had been disappointing. He attends sessions of the various Gas Associations, and in some cases is a member of several of them. But apart from the pleasure his visit to the place of meeting affords, and the taking part in the social features of the occasion, there is little to interest him; and I think that any of the active workers in these bodies will be willing to admit the weight of this assertion. It is not to be supposed that anyone who has watched the progress of the industry for the last few years will deny the prominent place to which the commercial gas man has attained in the movement; nor will he refuse to accord him acknowledgment as one of the most prominent factors, if not the most prominent one, in the promotion of the industry to-day.

From the nature of the gas man's training, he is not, in the general acceptation of the term, a commercial man. His environment has all been rather hindering to the development of commercial instinct. He was for years in the field without any competitors; and his goods practically made their own market without solicitation or advertising, for they were better than anything else. His was the only shop where they could be bought; and the air of "take it or leave it" was predominant in his place of business. This was not conducive to the development of commercialism in his make-up, and did not fit him to meet what was in store for him in the way of competition. This condition of things was all very well while there was no competitor in the field, and his path was an easy one, and the gait a seemingly safe one, though slow.

But there was a rude awakening due the gas man. A young and energetic rival came into the field, full of enthusiasm, and with up-to-date methods of business. We older gas men remember the shock this new lighting man gave us; and with the then existing appliances at hand, we were poorly equipped to meet him. The old-fashioned flat-flame burner, yielding but 4 to 5 candle power efficiency per foot of gas, was a poor weapon indeed with which to protect our interests. I think the most optimistic gas man of that day felt that he was leading a forlorn hope, and that things were certainly looking most unpromising for him. He saw his business rapidly getting away from him. But his salvation for the time being was at hand; and here the appliance man comes prominently into view, for though we can hardly class the discoverer of the mantle lighting system—Dr. Auer von Welsbach—as an appliance or a commercial man, he was not a gas engineer, and the industry profited by the labour of one who started the commercial man in a field which the latter has developed wonderfully. Surely this was a revolution. It certainly saved the day for the gas man.

But, notwithstanding the advent of the incandescent system of gas lighting, and all the energy and effort put forth by the gas man, the electric light was making serious inroads in his output. The unit of sale per meter was gradually but surely lessening; and he must take on more commercialism if he would keep to the front. His curve-line charts showed a daylight line which proved that for many hours of the twenty-four his plant was earning no money. He began to realize that a new maxim must be learned. He adopted this one: "Increased consumption means reduced cost per thousand;" and a most profitable maxim it is. Here, again, I think that a large amount of credit must be given to the commercial gas or appliance man. He was in the field, and had already taken the initiative in the matter of advertising and promoting his business; and with a generous expenditure of energy and money, he was pioneering in new fields. Evidences were apparent of his energy and enterprise; and this is the man who was the largest factor in making the daylight line on the "send-out" chart alter. His missionary work, as he travels about preaching gas as a fuel, is accomplishing for the gas industry a work the worth of which could be hardly computed if looked upon in the shape of advertising.

So much for the claim of the commercial man for a hearing in the industry. Does he get it now? And is he likely to get it under existing conditions that govern Gas Associations? He has brought about a new demand on the time and attention of the gas man and his Association. There must be some room made for him and some time given to the discussion of matters interesting to him. And if, as it is claimed, this is not in the possibilities of the existing Associations, he must bring this about in some other way; for it is without question desirable his matters should be taken up, looking to the promotion of his end of the industry.

There are many considerations due to every commercial gas man from the Gas Associations. First of all, he is entitled to a standardization of his appliances. This is not only important to him, but to the buyer, the seller, and the user of them. Under existing conditions, he is in the peculiar position of having his appliance commended and accepted in one place, and completely condemned and refused in another, where, to him, apparently the same conditions exist. Then, again, the matter of misrepresentation by salesmen, through ignorance or intent, will be curbed. In the absence of authoritative figures for quotation, the seller and buyer are often misled as to what is right to claim in the matter of efficiencies, and the misleading statements of the zealous salesmen are transmitted to the user with the assurance that the appliance will do so-and-so; and when it falls short of what has been promised for it, trouble follows, and not only is the immediate user disappointed, but the prejudice which is created is far-reaching in its effect, and perhaps spoils the sale of many similar articles. If the Gas Association man would set the appliance man right in some of these important questions, the former's troubles would grow proportionately less.

There are many other matters that could be discussed at a conference of the gas man and the gas appliance man, to the advantage of both. Methods of advertising, advantageous ways of displaying goods, the best means of demonstrating, how to do the best educational work among gas consumers, and many other subjects, looking to the interest of both engineer and commercial gas man. These are in part what could be talked of at a joint meeting of the Associations and at a meeting of the commercial men, if it were deemed advisable to hold one independently of the gas men. There are many subjects which the appliance man and the commercial gas man could talk over among themselves to advantage.

The President mentioned a few subjects which might be considered, and then proceeded: The hearty response with which the suggestion of forming such an organization as the National Commercial Gas Association was received, offering as it does an opportunity to take these matters up, assures its success so far as numbers are concerned; but it should be understood that mere numbers in such an organization as this mean but little. Unless there is hearty co-operation by all, little can be accomplished. The enthusiasm that is felt at a convention must be spread over all the period between meetings. Much earnest work must be done between times by efficient committees, heartily seconded by the entire Association; otherwise we shall not make the work a success. It should be brought home to each and every member that work and not the adoption of resolutions is what tells.

There are various ways in which to go about the work. First of all, I believe the best results for the gas industry can be attained by co-operating with the existing Associations in arranging for joint meetings. It should be kept in mind that the Associations are bound to take a lively interest in our doings. They are perhaps more interested in us than anyone else is. Your success will incidentally mean theirs, and their success yours. The matter of an exhibition is made much more feasible if you have the co-operation of a Gas Association. It might be possible to have the meetings held in such a hall as would be suitable for exhibition purposes as well as a meeting-room. The engineering men might hold alternate meetings with the commercial men, or the technical men might hold their meeting during the daytime—say, in the exhibition hall, where the appliance would be readily accessible to them for examination—and the appliance men might hold their meetings in the evenings. Thus the lamp men could make an exhibition of their goods to advantage; and if the three evenings of the week were sufficient for the reading of the commercial men's papers and discussing them, then the exhibition could be thrown open to the public, and the commercial men could do some missionary work in the city where the meeting is held, and no doubt, if it were properly advertised, attract considerable attention.

These are some of the things that occur to me to be possible of accomplishment by the National Commercial Gas Association. Whether they can or not depends entirely upon the efforts of its individual members. The organization of such a movement is not difficult of accomplishment; but the carrying of it on is a different matter. It cannot be done without money; and perhaps that is not so difficult to get. But of more vital importance is the effort of earnest workers.

It must be understood that anything that has been said relative to the condition of things, so far as the management of the existing Gas Associations is concerned, is not to be considered as derogatory of their work; for we realize, as do many of the members of these Associations, that it is simply impossible in the limited time of their sessions to reach, even in a most superficial manner, the subjects in which the commercial man is most interested. What, then, is to be done with his problems? How and by whom can they be reached and intelligently and satisfactorily solved? I think this can best be done through just such an organization as the National Commercial Gas Association, with the assistance of the existing Associations or the proposed American Gas Institute.

I think I have said enough of the purpose of this Association to make it clear that there is a field for it, and have made answer to the inquiry: "Is there a good and sufficient reason for the existence of such an Association?" If you are asked the same question again, which you undoubtedly will be, let your answer be given in no uncertain tone, nor leave room for doubt as to your individual stand in the matter.

The address was referred to a Committee; and the meeting adjourned.

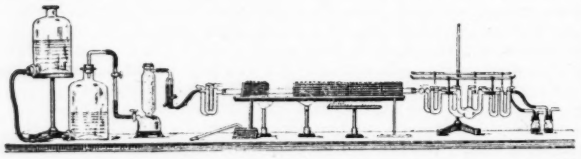
ULTIMATE ANALYSIS OF COAL.

The method and apparatus employed for the complete ultimate analysis of organic substances, coal in particular, which has been worked out and described in former papers by Herr M. Dennstedt, has been submitted to a few modifications in matters of detail, and an account of it in its modern form was given a short time ago in the "Journal für Gasbeleuchtung" by that author in collaboration with Herr F. Hassler.

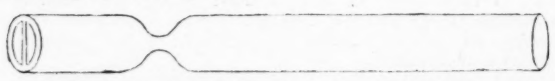
The principle of the operation consists in volatilizing coal in a current of oxygen, burning the vapours so produced by bringing them into contact with heated "platinum-quartz," or more simply a roll of foil or a mass of platinum wire, holding the sulphur, chlorine, and nitrogen oxides by means of heated lead peroxide, and absorbing the water vapour and carbon dioxide in suitable apparatus of such size that they can be used for a long series of combustions before becoming exhausted. As the coal is heated in a boat, a weighing of the latter after the process gives the amount of ash; and in it the iron, sulphuric acid, and matter insoluble in hydrochloric acid can be determined. The spent lead peroxide can be analyzed, so that the proportion of pyrites and calcium sulphate can also be deduced as the result of one operation.

Attempts to obtain concordant and useful figures from the ultimate combustion of coal, have often proved failures—sometimes because the sulphurous and nitrous acids produced have not been completely absorbed, and sometimes because the methane has not been completely oxidized. In the authors' process, the former source of error is entirely eliminated by virtue of the lead peroxide; while they have instituted direct experiments to study the causes of the latter fault. With this object in view, they have heated pure methane, mixtures of methane with hydrogen and coal gas in admixture with oxygen, under conditions which enabled the speed of the oxygen and of the gas to be altered, passing the whole over ignited copper oxide or strongly-heated platinum foil.

After treatment in the usual absorption apparatus, the residual gases have been again passed over similar catalyzing substances heated in an electric furnace to a temperature of 1200° C. The results have shown that pure methane is never completely oxidized by either substance; the quantity of unconsumed gas being the greater as the oxygen was in larger excess, and as the speed of passage was the slower. Platinum was found to be a more active material than copper; but the amounts of (combined) hydrogen and carbon retained in the second absorbing apparatus did not agree with the composition of methane—the carbon being in excess—so that on the first heating some unsaturated hydrocarbons or some carbon monoxide must have been formed. However, if the combustion is conducted rapidly, and if the amount of oxygen employed is kept at nearly the theoretical amount required, the errors are too small to affect the result sensibly; and when the methane is diluted with hydrogen, or (as in coal gas) with hydrogen and other combustible materials, the error is *nil*.



The complete apparatus used by the authors for the rapid analysis of coal is shown in the accompanying figure. As will be seen, it is constructed in duplicate, so that two analyses of the same coal can be carried out simultaneously. Starting at the end of the combustion tube from which the products of combustion escape, each tube contains three boats charged with lead peroxide, and then the contact-substance; the distance between the latter and the nearest boat being a little over 2 inches. The lead peroxide is raised to 320° C.; preliminary experiments with a thermometer indicating the size of the gas-flames given by the perforated tubular burner necessary to produce this temperature. The platinum contact substance is brought to a red heat. About 0·3 gramme of air-dried coal is weighed out into a tared porcelain boat for each combustion tube; but in order to prevent the coal burning appreciably in the stream of oxygen before carbonization is finished, the boats are not put directly into the tubes, but into smaller tubes, also made of combustion glass, having the design shown by the annexed sketch.



By this device, the bulk of the oxygen admitted to each combustion tube travels through the annular space, and does not come into contact with the combustible matter until it has been distilled out of the boats. The end of the interior tube bearing the boat is pushed to within a few inches of the glowing contact matter, and then the slit burner is lighted cautiously, so that the little flame representing some combustion of the coal is kept within the interior glass tube. The richer in gas the coal is, the more slowly should it be heated, and the longer should the internal tube be; the portion before the constriction being made up to 6 inches in length. When the coking is complete, the current of oxygen is urged, and the oxidation is finished at a red heat.

The quantity of sulphuric acid retained by the alkali of the glass is usually small enough to ignore; but for highly accurate work, the tube and contact substance may be rinsed with water and added to the liquid extracted from the lead peroxide.

The process was tried in the State Laboratory at Hamburg upon innumerable specimens of coal, and only gave any trouble when a Bohemian gas coal very rich in hydrogen and poor in carbon was under treatment. Even here, however, the double oxygen apparatus already described allowed the combustion to proceed smoothly. After a little practice, the combustion can be concluded in half-an-hour. If performed in duplicate, and the coal has not much sulphur in it, the lead peroxide from all six boats is mixed together before analysis. When coke is analyzed, the internal boat tube is not used. Further information may be obtained from Herr Dennstedt's book, "Anleitung zur vereinfachten Elementaranalyse," published by Otto Meissners, in Hamburg.

FLUCTUATIONS IN UNACCOUNTED-FOR GAS.

At the last General Meeting of the Bohemian Association for "Gasindustrie und Beleuchtungswesen," held at Asch during September, 1905, some discussion took place on the subject of the variations that are noticeable at different times of the year in the proportion of gas lost to the owners of small gas-works.

Herr Herrmann, of Gablonz, who has suffered from the trouble in question, drew attention to some tests he had carried out with dry meters of certain makes, which appear to explain the anomalies. He finds that many dry meters, which register correctly, or fairly so, when they are running at about their nominal maximum speed, register very slowly, or very much more slowly, when they are only supplying a smaller number of lights. In his communication, he quotes the results of testing nine of such meters, ranging from 3 to 10 lights in size, and in age dating from 1884 to 1901. As a fair example, it may be said that a certain 5-light meter constructed in 1897 read 1 per cent. fast when supplying five lights, 3·5 per cent. slow when supplying three lights, and 15 per cent. slow when supplying only one light. Several meters failed to register at all when passing 3·5 cubic feet or less per hour. As most consumers' meters, in ordinary conditions, are running further below their maximum capacity in the summer months than in the winter, the greater loss of gas during the former period is explained. Herr Koss, of Eger, corroborated, but offered no figures. He had found that many dry meters refuse to register when they are passing only a little gas. Another member suggested that the loss of gas might be accounted for by the difference in temperature at the station meter and at the meters of the consumers; but Herr Herrmann rejoined that this was not a sufficient explanation of the losses experienced. [Apparently the effect of falling temperature in the mains should be to represent the loss as greater in the winter than in the summer.] In his reply to the discussion, Herr Herrmann pointed out other contributory causes, such as the multiplication of small errors in reading individual meters, and the way in which gas slips through dry meters at a slow rate without moving the dials.

In a note sent to the "Journal für Gasbeleuchtung" on the same subject, the writer describes his experiences in the discovery of leakage in a distributing system. The local leakage was abnormally high; but although several faults were traced and made good, the figure could not be brought to proper limits. Shortly afterwards his attention was drawn to the unusually large amount of water requiring removal from two of the syphon-boxes. Finally one particular length of main in the immediate vicinity of the boxes was uncovered; and it was found that the pipe was lying in such wet soil that in damp weather it was below the natural level of the ground water. A $\frac{3}{8}$-inch hole had been drilled in the pipe some time or other, and had never been plugged; so that whenever the ground water rose, liquid entered the pipes, flowing out again in dry weather. The leakage was not observable by the smell, as the ground was marshy and emitted an odour of methane. Where gas-mains lie in swampy soil, therefore, the writer of the note suggests that a watch on the quantity of water pumped from the syphon-boxes should afford a useful check on faults in the distributing system.

Suggested Royal Commission on the Supply of Electricity in Bulk.—At the meeting of the Court of Common Council of the City of London last Thursday, a report was brought up from the Streets and Special Joint Committees, to whom had been referred the various Bills relating to the electric power and lighting supply in London and kindred subjects, which are to be introduced into Parliament this session. They recommended that all the Bills should be formally opposed, and that the Government should be asked to appoint a Royal Commission to inquire into, and report upon, the whole question of the supply of electricity in bulk. This was agreed to; and it was referred to the Committee to give effect to their suggestion.

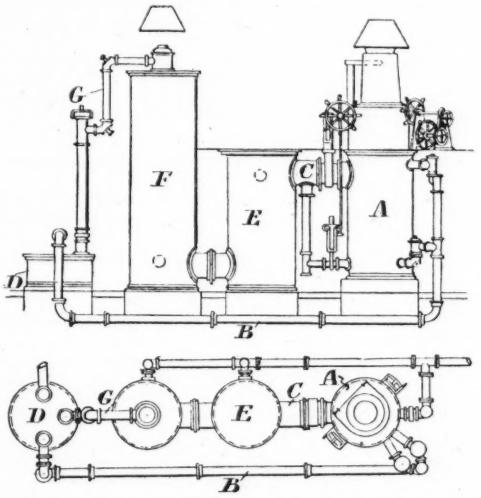
REGISTER OF PATENTS.

Water-Gas Generators.—Bueb, W., of Charlottenburg, Germany. No. 1434; Jan. 24, 1905.

The patentees' proposal is for a generator "by means of which water gas can be manufactured and carburetted without the aid of illuminating gas;" the generator being also "suitable for the manufacture of pure water gas—that is to say, of water gas which can, if desired, be carburetted by means of benzol and illuminating gas." For this purpose, "certain modifications are made in the construction of the water-gas generators hitherto known, whereby the gas produced in the generator may be either passed into a carburettor and fixer in the known manner, or pure water gas may be drawn off from the generator to be used in such pure state or afterwards carburetted by means of illuminating gas if so required."

The generator A is of greater height than is, for instance, usual in the case of the Dellwik-Fleischer apparatus. A pipe B leads directly from the generator to a condenser D, of any suitable construction, from which the gas is caused to pass to the mains in the usual manner. Another pipe C leads from the generator to a chamber E, in which solid or semi-liquid non-volatile hydrocarbons—such as petroleum-residues or the like—are heated to a high temperature or gasified. The chamber is connected with a superheating apparatus F, which communicates with the condenser by the pipe G. Valves are arranged in the connecting pipes in such a manner that the generator can either be placed in direct communication with the condenser by means of the pipe B, or the latter can be closed and the generator placed in communication with the chamber E by the pipe C.

For producing pure water gas, the generator is disconnected from the chamber E and charged with a comparatively thin layer of coal, so that when the latter is ignited and air blast is applied all the carbon monoxide generated is converted into carbon dioxide. The manufacture of water gas then proceeds in the usual manner; the gas produced being conducted to the condenser D and thence either directly to the consumer or to suitable apparatus in which it is carburetted by means of benzol vapours and ordinary illuminating gas.



If, however, it is desired to effect the carburation of the water gas without the aid of illuminating gas, the pipe B is closed, and the generator is placed in communication with the chamber E by means of the conduit C. The fuel in the generator is then stacked to such a height that the combustion produces only carbon monoxide, and no carbon dioxide. The carbon monoxide produced is conducted into the chamber E before the latter is charged with hydrocarbon; air being supplied to the chamber through a valve adapted to be operated from a platform at the side and at or about the height where the water gas passes into the carburettor, so that the carbon monoxide is converted into carbon dioxide and the chamber is rendered red hot by the heat generated. Hydrocarbon is then introduced into the chamber E through a spray pipe (not shown) arranged in the cover, and, by means of a pump, the oil is forced through the spray pipe, which finely divides it, so that it is rapidly gasified by contact with the heated walls of the latter. While the hydrocarbon is being introduced into the chamber E, water gas is produced in the generator; this gas being thereupon introduced into the chamber E, in which it becomes mixed with the gaseous hydrocarbon. The mixture of water gas and hydrocarbon passes to the superheater F. From the superheater the "stable mixture" passes to the condenser D, and thence to the consumer.

It will thus be seen that when pure gas is to be produced the generator A is first cut off from the carburettor by closing the pipe C, and the work is carried on with pipe B, leading to the condenser, open. The exhaust gases produced pass through a chimney into the open air. Thus during the manufacture of pure water gas the carburettor and superheater are completely disconnected, so that the generator and exhaust gases produced are prevented from passing into it, as they would otherwise do, and have to be driven out. The carburettor and superheater are also "relieved by this arrangement; since they are not used in the manufacture of pure water gas, and therefore require less repair."

When carburetted water gas is to be produced, the pipe B is closed, and the pipe C opened; and the exhaust gases do not pass into the generator chimney, but to the carburettor and superheater through the conduit C, where they are converted into carbon dioxide for heating the carburettor and superheater, and render it suitable for the gasification of the oil. The carburettor and superheater consist of sheet-metal jackets having checkered fire-brick linings. The bricks are heated, and then oil is sprayed into the carburettor as described; the oil being vaporized on the hot fire-brick material. At the same time water gas is produced in the known manner in the generator—both gases uniting and being "rendered stable in the superheater."

Valves of Gas-Meters.—Glover, R. T., of Queen Victoria Street, E.C. No. 5877; March 20, 1905.

In the ordinary method of constructing and affixing the slide or D valves of gas-meters, the patentee points out, the valve is cast with a guide-rod projecting on either side—one rod being kinked and carrying a lug having a pin for connection to the arm from the crank, which ensures the reciprocation of the valves. This construction has, he says, been found inconvenient, because the guide-rods, being fixed to the valve, the valve had to be carefully adjusted for proper movement, and when this adjustment was effected, the lug had to be pinched on to its guide-rod and the valve and guide-rods carefully removed and the lug soldered to the guide-rods; then the valve and its guide-rods had to be replaced in position, and the connection made with the crank-shaft arm. The present invention "overcomes these difficulties and much reduces the cost of fitting and adjustment."

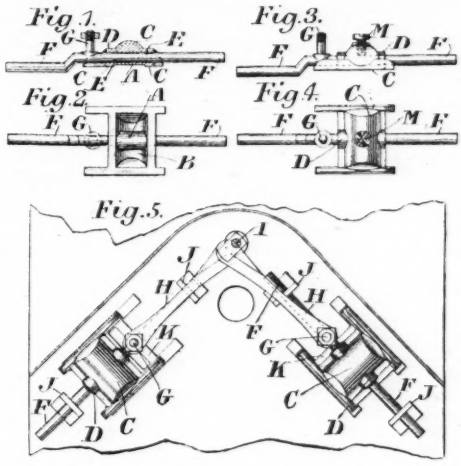


Fig. 1 is a section of a D valve; the guide-rod being in full lines. Fig. 2 is an under plan of fig. 1. In this case, the guide-rod is fixed by solder. Fig. 3 is a side view, and fig. 4 a plan of a D valve and guide-rod fixed by a set-screw. Fig. 5 is a plan of a portion of a meter casing with its two valves.

The wall or bridge A in the middle of the hollow B of the D valve C, has formed through it, as also through the walls D of the valve, a hole E. There is one kinked guide-rod F only, and this passes through the hole E in the valve; the guide-rod F having formed thereon the usual pin G for carrying the arm H connecting with the crank-shaft I.

To fit the valve C to the meter, the guide-rod F is passed through one of the guide-posts J, and the valve C placed on its seating K; the rod F being in such position that the other end is opposite the hole in the other guide-post J, through which hole the end is passed, and the crank-lever connected to the pin G on the guide-rod F. The valve C is now positioned or adjusted by hand on the rod F as regards its seating K, and the rod and valve are soldered together as at figs. 1 and 2, while the valve is on its seating. There can thus be no alteration of the adjustment.

Gas-Lamp Controller.—Stevenson, F. W., and White, J. H., of Coventry. No. 7269; April 6, 1905.

This invention relates to gas-lamps of the type in which an increase of pressure in the main causes a bell to move upward in a liquid seal—thus allowing the gas to escape into a second bell, which, in turn, also moves upward in a liquid seal, and while doing so actuates the cock to admit gas to the burner.

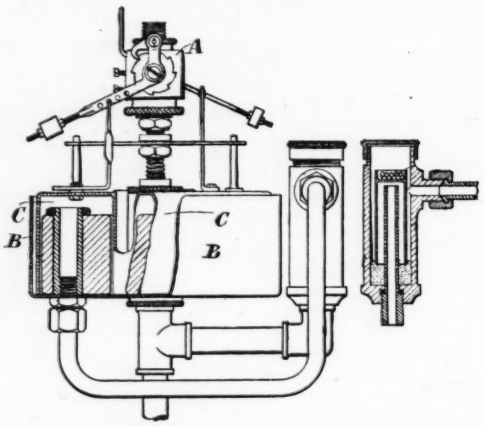
The illustration on the next page shows a side elevation (part broken away) of a convenient construction of gas supply controlling apparatus embodying the invention, and a longitudinal median section of the liquid seal for the float gas-supply bye-pass.

The gas supply to the burner is controlled by a rotating cock A, on the plug spindle of which is fixed a ratchet-wheel. Surrounding the burner feed-pipe is a tank B, in which is placed an annular float C, which dips into a seal of mercury contained in the tank. To reduce the necessary amount of mercury, the tank is provided with an annular wall, which fills up the greater part of the space in the float when the latter is in its lower position, so that the mercury is restricted to the parts where the sealing takes place. This wall may be made solid, as shown, of plaster of Paris, or, if desired, of hollow sheet metal. Besides lessening the quantity of mercury required, the wall economizes the amount of gas needed to raise the float.

Pivoted on the burner-tap spindle, so as to rotate on it, is a bell-crank lever, the short arm of which carries a pawl adapted to engage the teeth of the ratchet-wheel. The long arm of the lever is loosely pivoted on a bracket secured on the top of the float, so that as the float rises, the lever will be turned on its pivot, and the pawl, engaging the teeth of the ratchet-wheel, will turn the tap. As shown, the ratchet-wheel has eight teeth; and the travel of the float is such as to rotate the tap one-eighth of a complete revolution. The tap has two passages, at right angles to each other, completely through it; so that each quarter-turn of the tap places it in an "on" position—there being four "on" positions and four fully "off" positions for each complete revolution.

As shown, a counter-weighted arm may be provided on the opposite

side of the float to balance the lever, and a rod or rods on the float may pass through a guide attached (say) to the burner feed-pipe. The underside of the hollow float is fed from the burner feed-pipe through a bye-pass, which comprises a pipe leading from the feed-pipe into a regulating chamber D, and a second pipe leading from the regulating chamber into the float tank B.



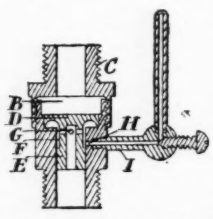
The regulating chamber, as shown, is conveniently cylindrical and carried vertically on the end of a pipe, of which a continuation passes through its base and extends upwards therein to a convenient height. Preferably at or above this height, the end of the pipe enters through the side wall—being connected in any convenient manner.

In the regulating chamber floats a bell surrounding the inlet pipe, and having its rim normally dipped in a small quantity of mercury—thus forming a liquid seal to the supply pipe. The bell is weighted so as to rise only when there is a certain pressure beneath it; and this pressure is preferably above the normal pressure in the mains. Means are provided to enable the weight of the bell to be readily regulated—say, as shown—by forming the top of the bell with a pocket in which shot or other weights may be placed.

The operation of the device—assuming the supply to the burner to be "off" and the usual lighting bye-pass to be alight—is as follows: The pressure in the mains is increased above its normal, so that the bell in the regulating chamber D is raised and the liquid seal broken. The pressure then finds its way to the annular float C, which it raises, turning on the gas-tap in the manner described. The gas is now "on" and alight; and the pressure is restored to its normal. This causes the bell to fall, and the liquid seal to be restored. The float, under the action of its weight and counterweights, falls slowly—the gas beneath it escaping through the small vent in the regulating chamber. When it is desired to extinguish the lamp, the pressure is again raised above the normal, and the float rising will turn the tap another eighth-of-a-revolution, bringing it into an "off" position.

Automatic Bye-Pass for Gas-Burners.—Nichols, A. E., of Folkestone, and Brown, A. C., of Finsbury Avenue, E.C. No. 7984; April 14, 1905.

This automatic bye-pass consists of a fitting having a central hole and an upper enlargement; the valve fitting the enlargement having a stem extending down the central hole, and the stem of the valve being arranged so that an enlargement near the bottom of the stem fitting and sliding in the central hole shall, when the valve is lifted to supply the burners, cover, and cut off the gas supply from, a cross hole in the fitting leading to the bye-pass or pilot light or number of such lights, but open the supply to the bye-pass when the valve falls to close the main burners.



In the upper part of the body of the fitting shown is a recess B. C is a cap with the nozzle externally and internally screwed for attachment either to another pipe or to a burner direct. D shows the valve with its stem, which loosely fits the central hole in the body at the part E, but which stem is reduced somewhat in diameter at the part F, to make a small concentric space between its outer surface and the inside of the hole in the body, for the purposes referred to. G is one of the cross holes drilled through the top part of the valve stem into the longitudinal hole. There may be three or more of these cross holes spaced round the stem. H is the cross hole in the body of the fitting leading to the bye-pass tube; and I is the bye-pass screwed into it. There is shown an optional enlargement in the bye-pass tube, having an adjusting screw, which can be screwed down more or less closely on to the end of the aperture of the tube at a point where it turns at right angles, for the purpose of adjusting the size of the bye-pass flame.

Incandescent Mantles for Gas-Burners.—Woods, J. E. T., of West Norwood, S.E. No. 8162; April 17, 1905.

The patentee in his provisional specification says: The disadvantages attending the use of all kinds of incandescent mantles for gas-burners is their brittleness and liability to damage (after burning) from the slightest shock. To obviate this great drawback, my safety incandescent mantles are constructed on a framework of fine metallic wires of such material as to be unoxidizable and incapable of being melted in the heat of the burner. There are several alloys that can be drawn into fine wire which fulfil these conditions and are of moderate cost (platinum is too costly for common use). But an alloy which is found to answer the purpose very satisfactorily is composed of one-third nickel or nickel and cobalt, one-third tungsten, and one-third of an admixture of half tin and half copper. This alloy is white, and is capable of being drawn into very fine wire—which is very flexible, is not oxidizable in heated air, and will not melt in the gas-burner. These wires are spun over with an incombustible fibrous material—such as asbestos or hard, spun glass. The wires so covered are woven into a network of fine mesh of the size and shape of the mantle required. These networks are dipped into a solution of one or more of the earthy metallic oxides—such as thorium, cerium, yttrium, glucinium, or titanium—the acid solvent being hydrochloric acid or, where admissible, acetic acid. They are allowed to dry, and, after re-dipping, are baked at a high temperature in an oven so as to drive off the acid and leave the incandescent oxides on the fibrous material. The operation of dipping and baking the mantles may be repeated several times, until there is sufficient light-giving and infusible oxides on the fibrous coating of the wires to give the incandescent effect of the gas and air burning in the mantle. These mantles last a considerable time and will not break, even with rough handling. When the coating of the light-giving oxides on the fibrous material of the mantles becomes inert or worn out, they may be renewed by re-dipping in the original solutions of earthy metallic salts and re-baking as at first.

In his complete specification, the patentee gives further particulars. He says: The wire alloy, as described in the provisional specification, is first drawn down into wire not exceeding one-hundredth of an inch in diameter. This is then, in suitable machines, covered with fine fibrous asbestos; the finished filament being thus increased to about one-seventh of an inch diameter. This covered wire is then wound on bobbins and woven on a stocking machine into a cylindrical web of the diameter required for the mantles. This stocking web is cut into lengths as required. They are then dipped into a sensitizing solution composed of equal parts of chloride of glucinium and chloride or other salt of cerium. After drying, they are moulded on a suitable wooden mould to give them form. They are then placed in an oven heated to a temperature of over 600° Fahr., which concentrates the incandescent oxides—driving off the acids of the salts and leaving the light-giving oxides on the surface of the asbestos covering of the wire. The mantles may then be dipped in a weak solution of collodion to make them inflammable and preserve the oxides on the covered wire.

Glucinium (he adds), the use of which in the manufacture of incandescent mantles is known, is commonly believed to be a rare metal, but is readily obtained in large quantities from Beryl granite occurring in the Morne Mountains and numerous localities abroad.

APPLICATIONS FOR LETTERS PATENT.

7519A (1905).—Helps, G., "Valves for use with dry mains in gas manufacture." Feb. 7.
2785.—Mittmann, C., "Inverted burners." Feb. 5.
2800.—Scharenberg, O., "Gas-engines." Feb. 5.
2818.—Knauff, L., "Gas power." Feb. 5.
2870.—Kestner, K., "Cleaning gas-filters." Feb. 6.
2907.—Wilton, G., "Purification of gas." Feb. 6.
2929.—Sims, W. E., and Bowes, H., "Recovery of cyanogen compounds." Feb. 7.
2938.—Ehmann, C. P., "Inverted burners." Feb. 7.
2945.—Boyd, W., "Drilling mains under pressure." Feb. 7.
2977.—Lowen, W., "Gas-burners." Feb. 7.
2980.—Busquet, R., and Ramassot, M., "Incandescent burners." Feb. 7.
3014.—Lucas, A. W., "Incandescent lamps." Feb. 7.
3024.—Simpson, S. W., "Incandescent burners." Feb. 7.
3037.—Goodridge, R. H., "Gas-governors." Feb. 8.
3054.—Thorp, T., "Rotary meters." Feb. 8.
3060.—Griffin, S., "Suction gas-producers." Feb. 8.
3122.—Chemische Fabrik Rhenania and Projahn, F., "Obtaining sulphur from sulphuretted hydrogen or gaseous mixtures containing the same." Feb. 8.
3145.—Streubel, C. G. A., "Incandescent mantles." Feb. 8.
3146.—Tempel, F., and Spielter, W., "Portable and semi-portable suction-gas engines." Feb. 8.
3148.—Rosie, J., "Automatically lighting and extinguishing gas-lights by varying the pressure in the mains." Feb. 9.
3160.—Love, J., "Incandescent burners." Feb. 9.
3203.—Thierfelder, M., "Igniting devices." Feb. 9.
3209.—Terrell, T., "Inverted mantles." Feb. 9.
3271.—Cuttell, T. L., and the Anti-Vibration Incandescent Lighting Company, Limited, "Gas-brackets." Feb. 10.
3290.—Jaspersen, H. C. M., "Regulator for gas-pressure." Feb. 10.
3294.—Clayton, T., and Smith, G., "Inverted burners." Feb. 10.
3315.—Müller, P., Mayer, E., and Thies, P., "Gas-lighting apparatus." Feb. 10.
3339 —Clama, A., "Manufacture of oil gas." Feb. 10.

Lighting of Birmingham Courts.—The Birmingham Public Works Committee are about to light between sixty and seventy more of the courts in the city. There are upwards of 6000 courts in Birmingham; and of these about 4000 are already lighted. Others will be lighted gradually, until the whole are provided with gas illumination. The Committee exercise their powers under the Consolidation Act by serving notices on the owners of houses in the courts requiring them to provide the proper means of lighting, which is by the erection of lamps. If the owners do not comply, then the Corporation do the work and charge the owners of the property with the cost. As a rule, the owners leave the matter to the Corporation, who carry out the work practically at cost price; while the gas is supplied by the Gas Department on special terms. The lamps are cleaned, lighted, and extinguished by the department free of cost, just as the street-lamps are dealt with.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

The Proposed Removal of Sulphur Restrictions.

SIR,—At this time of day, I am astonished that any corporation, gas company, or engineer should desire to oppose the removal of penalties in regard to sulphur. Surely, these opponents are behind their time, after the extensive investigation held on the subject in 1877. In the evidence given in the report (p. 9), Mr. Philbrick says: "Let me tell you, as far as we can ascertain, it never has been alleged, even by Dr. Letheby who discovered its presence, or by any of the eminent chemists or gentlemen who have been consulted on the point, or who have given their attention to the matter, that, with regard to the *health* of the community itself, the presence of this infinitesimal quantity is at all objectionable or deleterious." Again, on page 7 we are told: "To get 1 cubic foot of sulphurous acid gas, which will go quite easily into the crown of a man's hat, we have to burn 1500 cubic feet of the gas supplied."

Surely these two extracts out of the many contained in this elaborate report should be sufficient to show these objectors how futile and ridiculous they appear to those who have studied this subject. I trust all gas companies and corporations will be freed from the sulphur restriction, and all in this free country allowed to compete on equal terms.

Newry, Feb. 17, 1906. ANDREW GIBB.

The Future of the Gas Profession.

SIR,—For some weeks past there have appeared in the "JOURNAL" letters on salaries, &c. Now, no hard-and-fast line can be laid down for Committees to act upon. Let the rising generation of gas managers prepare themselves by reading, experimenting, and thoroughly informing themselves in every detail of gas making; learning what has already been done, and pressing forward to accomplish other and better plans of action. By these means, higher appointments and salaries will be offered and received. I see in your advertisement columns that some excellent second-hand books on gas are for sale, and some of them being out of print, Why not Invest and Study? From my own experience, I would advise this; and I trust much progress and comfort will result from the advice.

Feb. 17, 1906. AN OLD HAND.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The Opening of Parliament—The King's Speech.

The Second Parliament of his present Majesty was opened by Commission last Tuesday. It was the first meeting after the General Election, and the preliminary business, of course, included the choice of a Speaker. Sir Wilfrid Lawson, Bart., proposed—"That the Right Hon. James William Lowther do take the chair of this House as Speaker;" and the Right Hon. C. B. Stuart-Wortley seconded the motion. Mr. Lowther having expressed his sense of the honour proposed to be conferred upon him, the motion was carried unanimously. Mr. Lowther was then conducted to the chair by the proposer and seconder of the motion for his election, and he again thanked the House. The next day the Speaker reported that His Majesty had been pleased to approve of the choice the House had made, and that he had granted all their ancient rights and privileges. The Speaker then took and subscribed the oath; and his example was followed by the Prime Minister (Sir Henry Campbell-Bannerman) and several members. The House was engaged until Thursday on similar business, at the conclusion of which there was an adjournment till yesterday, when His Majesty opened the session with the customary formalities. In the course of his Speech, it was noted with satisfaction that the imports and exports of the country continue to show "a steady and accelerating increase," and, together with the growing activity of trade at home, indicate that the industries of the people are, in general, "in a sound and progressive condition." It was also mentioned that Bills would be submitted for dealing with the law regulating trade disputes, and for amending the Workmen's Compensation Acts, as well as for the further equalization of rates in the Metropolis, and for amending the Unemployed Workmen Act.

Petitions against Private Bills.

In accordance with the Commons Standing Order No. 128, which requires petitions against Private Bills to be deposited on or before the 12th of February, the following (among other) petitions have been presented against the Bills named:—

Additional Electrical Power Supply (London) Bill, by the South Metropolitan, South Suburban, and Wandsworth and Putney Gas Companies.
Administrative County of London and District Electric Power Bill, by the Gaslight and Coke, Mitcham and Wimbledon, South Metropolitan, South Suburban, Wandsworth and Putney, and West Kent Gas Companies.
Ascot District Gas (Electric Lighting) Bill, by the Aldershot Gas and Water Company and the Easthampstead Rural District Council.
Bacup Corporation Bill, by the Rawtenstall Corporation.
Burry Port Gas and Improvement Bill, by the Llanelly Gas Company.
Cardiff Gas Bill, by the Cardiff Corporation and the Glamorgan County Council.
Cheltenham Gas Bill, by the Cheltenham Corporation.
City of London Electric Lighting Bill, by the South Metropolitan Gas Company.
Derby Gas Bill, by the Derby Corporation and the Draycott Gas Company
Dowlais Gas Bill, by the Merthyr Tydfil Corporation.
Epsom and Ewell Gas Bill, by the Redhill Gas Company.
Gas Companies (Removal of Sulphur Restrictions) Bill, by the East and West Molesey, Hampton, Harrow and District, and Hebburn-on-Tyne Urban District Councils, the Gateshead, Hanley, Hastings, Ipswich, Newcastle-on-Tyne, Richmond (Surrey), Shrewsbury, Wallsend, Wandsworth, and Wolverhampton Corporations, and the London County Council.
Hackney Electricity Bill, by the Gaslight and Coke Company.
Heacham Water Bill, by the Docking Rural District Council.
Lancashire Electric Power Bill, by the Haslingden Union, Rossendale Union, and Ramsbottom Gas Companies, and the Radcliffe and Pilkington Gas Company.
London County Council (Electric Supply) Bill, by the Brentford, Commercial, Crays, Gaslight and Coke, South Metropolitan, South Suburban, and Wandsworth and Putney Gas Companies.
London Electric Supply Corporation Bill, by the South Metropolitan Gas Company.
Manchester Corporation Bill, by the Stretford Urban District Council.
Merthyr Tydfil Gas Bill, by the Cardiff Corporation.
Metropolitan Electric Supply Bill, by the Rickmansworth and Uxbridge Valley Water Company.
Metropolitan Water Board Bill, by the Hackney Borough Council, the Hertford Corporation, the Hertfordshire County Council, the Herts and Essex Water Company, the Lea Conservancy Board, a number of urban and rural district councils, and the Marquis of Salisbury.
Mid-Oxfordshire Gas Bill, by the Witney Urban District Council.
New Mills Urban District Council, by the Stockport Corporation.
North-East Lincolnshire Water Bill, by the Glanford Brigg Rural District Council.
Pontefract Corporation Bill, by the Pontefract Gas Company.
Rathmines and Rathgar Extension and Improvement Bill, by the Dublin Corporation and the Dublin County Council.
Rochester, Chatham, and Strood Gas Bill, by the Chatham, Gillingham, and Rochester Corporations.
Shoreditch and Stepney Electricity Bill, by the Gaslight and Coke Company.
South Lincolnshire Water Bill, by the Black Sluice Commissioners, the Bourne and Holbeach Urban District Councils, and the Bourne Water Company.
South Metropolitan Electric Light and Power Bill, by the Mitcham and Wimbledon, South Metropolitan, South Suburban, Wandsworth and Putney, and West Kent Gas Companies.
South Metropolitan Gas Bill, by the Conservators of the Thames and Messrs. William Cory and Son.
South Suburban Gas Bill, by the Beckenham and Penge Urban District Councils, the Camberwell, Lambeth, and Lewisham Borough Councils, the Croydon Corporation, and the London County Council.
Southampton Gas Bill, by the Southampton Corporation.
Sutton, Southcoates, and Drypool Gas Bill, by the Kingston-upon-Hull Corporation.
Thornton Urban District Gas Bill, by the Poulton-le-Fylde Urban District Council.
Todmorden Corporation Bill, by the Rochdale Corporation.
Tottenham and Edmonton Gas Bill, by the Tottenham and Edmonton Urban District Councils, the Middlesex County Council, and the Great Eastern Railway Company.
Uxbridge Gas Bill, by the Eton and Staines Rural District Councils, the Middlesex County Council, the Slough Gas Company, the West Suburban Gas Company, and inhabitants of Langley Marish and Horton.
Wandsworth and Putney Gas (Removal of Sulphur Restrictions) Bill, by the London County Council and the Wandsworth Corporation.
Watford Gas Bill, by the Chesham Gas Company, the Hertfordshire County Council, and the Watford Urban District Council.

Damages for the Leigh (Lancs.) Gas Explosion.—Mr. George Ward was last Friday awarded, at the Leigh (Lancs.) County Court, £14 11s. for damage to his furniture and the temporary loss of lodgers caused by a gas explosion on May 23 last year, when one woman was fatally injured, a house was wrecked, and two adjoining cottages, including the plaintiff's, were damaged. Mr. Daniel Garside, another tenant, was awarded £10 18s.

The Launceston Town Council and the Gas Company.—In the report presented at the recent annual meeting of the Launceston Gas Company, reference was made to the two subjects on which, as already recorded in the "JOURNAL," there has been dispute with the Town Council—viz., the supply of water and the disposal of the effluent from the sulphate plant. With reference to the water, the Chairman (Dr. Thompson) said the Company were assessed at £50 for five years' supply to the works. A meter had now been put in, and they were being charged at the rate of 9d. per 1000 gallons. From the consumption up to the present, it appeared probable that they would not use 10s. worth of water in the year. This would be satisfactory to the Company, and he hoped it would be to the Corporation. As to the effluent from the sulphate plant, the Town Council had asked them to remove the pit into which it drained. The Council were to pay half the cost of doing this; and he hoped that when the removal was carried out, they would hear no more about it.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Monday, Feb. 12.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* ROMER *and* COZENS-HARDY.)

The New Inverted Incandescent Gas-Lamp Company, Limited, v. The Globe Light, Limited.

As briefly announced last week (p. 408), judgment was delivered this morning in the above case, which was an appeal from the decision of Mr. Justice Joyce dismissing the action on the ground that the defendants had not infringed the plaintiffs' patent. The contentions and evidence on either side at the trial in the Lower Court were fully reported at the time.* The arguments on the appeal extended over a great part of four days in the previous week.

The MASTER OF THE ROLLS, in commencing his judgment, explained the object of the patent as being a contrivance for enabling incandescent gas-lights to burn downward, so as to put them more nearly on a par with incandescent electric lighting; no shadow being thrown by the body of the lamp. His Lordship went on to describe in some detail the construction and operation of a bunsen burner in its normal position, and its use for incandescent lighting. When invention had reached this point, it was found very desirable that some means should be discovered by which it would be possible to put the mantle at the bottom instead of at the top of the burner; and various contrivances were adopted for the purpose. One central difficulty staring inventors in the face was that the mixture of gas and air being lighter than air, its natural instinct to rise—if he might use the word—had to be overcome by bringing pressure to bear, either directly or by means of suction; otherwise the flame, instead of going down, had a tendency to turn up, and would strike back, ignite the gas at the nipple, where it entered, and so destroy the whole operation of the lamp. Under these circumstances, the patentee reviewed the various difficulties and the means which had been employed to get over them, and then went on to describe his own method, by which he claimed to have got rid of the drawbacks hitherto existing. [His Lordship here read the details of the specification.] His claim was: (1) A bunsen burner for incandescent gas lighting in which the mantle is suspended head downwards with an insulator, preferably made of bad heat-conducting material, with a deflecting cone on the side of the isolator, the latter terminating in a burner-head projecting into the interior of the incandescent mantle, for the purpose of obtaining a downwardly directed flame approximately of the shape of the mantle, and without the necessity of employing special mechanical means for producing a high gas pressure; and (2) the complete incandescent gas-burner substantially as described and illustrated in the drawings. The object, as the patentee himself showed, was to get a cool, or comparatively cool, insulator, which was not very definitely described; but it was perfectly clear, when one came to analyze it, that the insulator was the part between what he called the bunsen body—the place where the gas and air were mixed—and the point of ignition. It was that interval of tube interposed between the bunsen body and the burner-head; and the object of the invention was to keep this cool. The two contrivances by which he hoped to do this were, first, the insulator, which, by its position, and to some extent by the material of which it was composed, helped to counteract the heat derived by conduction from the flame up through the fabric of the isolator; and, secondly, the cone-shaped excrescence on the isolator itself, and, at the bottom, the pointed end of the cone being nearest the flame, the cone-like projection bulging gradually out from the point of the flame up the sides of the isolator, not quite half-way up. By these contrivances he hoped to deal with the heat, which he desired to mitigate as much as possible. By the insulator itself, he dealt with the communication of heat by conduction; and the deflector dealt with the heat communicated by convection. This being the plaintiffs' invention, the real point in the case was whether the defendants, by their contrivance, had infringed it. Suggestions were made in the course of the case that certain flaws might be discovered in the plaintiffs' own patent; but these matters did not really come into the question. They were not insisted upon, either in the Court below or there; and the question in both Courts resolved itself into this: Assuming the plaintiffs' patent to be good, had the defendants infringed it? It was said that they had; and that the contrivance by which they had done it was briefly this: They had taken, it was said, for all practical purposes, the same thing as the plaintiffs' insulator. There was some little difficulty in assigning a precise scientific meaning to what the plaintiffs intended to convey by the word "insulator." It had not been defined, either in its extent or its operation, to any precision; but assuming that the insulator was well described, and was an essential feature in the combination, it was said that the defendants had annexed it, and that the tube which they used was, for all practical purposes, an insulator. It was also said that they had a contrivance on this tube or insulator which was practically the same, both in its result and in the means by which this was procured, as the cone or deflector on the plaintiffs' invention. He had come to the conclusion that, comparing fairly the two things, the defendants' lamp could not be said to be an infringement of that of the plaintiffs. What was relied upon was that the defendants, upon what was called their insulator, just at the point of junction between it and what, in the language of the specification, was called the bunsen body, interposed something like an inverted saucer—a concave surface towards the ascending heat generated by the flame at the bottom. Its situation was really not on the insulator, but at the top of it, just at the point of junction with the bunsen body; and its surface being concave towards the ascending current, its purpose and effect *prima facie*—and he thought the scientific evidence on both sides accepted this—was to collect and concentrate upon the isolator the hot currents coming up from the flame. There was certainly strong evidence on the part of the defendants from distinguished experts that in fact it did accomplish this purpose. To say, therefore, that a contrivance whose apparent object was to accomplish, and which, in fact, did accomplish, that object—to collect and concentrate the heated air on the insulator—was an infringement of another contrivance which had for its object and effect the dispersal of the ascending heated air, and its deflection from the insulator, was almost a contradiction in terms. He agreed that there was a good deal of discussion as to whether, in the result, the ascending currents of air, when they reached what had been called the cushion of hot air collected inside the inverted saucer, did not then go round—clinging along the surface of the cushion until they got to the edge, and there became diverted into the open air; that when they got there they would be diverted similarly to the way in which the currents were diverted at the bottom of the insulator by the inverted cone. But there they got into a very—he was going to say a hazy region, but he had better say into very refined scientific views. They got into the region of speculation as to what was the behaviour of these gases—first under the inverted saucer, and afterwards when they went round the concave and out into the open air. Mr. Astbury had suggested that the essential element—desired advantage—was secured by the fact that these hot currents were deflected from the air-chamber up above, and that the products of combustion were thereby kept out of the chamber, which was very desirable, and was one of the objects of the plaintiffs' invention. But it was a remarkable thing that there was not a word in the patent about the effect of this inverted cone upon the access of the products of combustion to the air-chamber—there was nothing to indicate it either in the letterpress or in the drawings; and though it might be an accidental or incidental consequence of the contrivance, it did not appear to him to be anything which was really claimed by the patentees or which was in their mind. It was not in any degree a part of what they had defined as their primary object—viz., to have the insulator cool. If it were the fact that the deflector had this effect on the air-chamber, it was not part of the thing patented, and, moreover, the methods of safeguarding the access to the air-chamber, if so desired, from the access of the products of combustion were perfectly well known, and there was no room for invention in the matter. On these grounds, it seemed to him, as it did to the two learned Judges who had dealt with the matter, that the decision of Mr. Justice Joyce was correct; and therefore the appeal must be dismissed.

Lord Justice ROMER said it appeared to him that, taking the specification as a whole, and fairly reading it, the theory or basis on which the invention was founded was that the shaft of the inverted bunsen burner must be kept cool from the flame at the bottom, and that the patentees' method of carrying this out was by making the shaft to be what they called an isolator, and by placing upon it, near to the flame, a cone with its apex towards the flame, so as to throw off the hot air from the shaft. Accordingly, the claim was limited to an inverted bunsen burner with a cone and an insulator substantially as shown in the specification and drawings. Taking the defendants' burner, one could not say that the inverted umbrella-like covering used by them, shaped as it was and placed where it was, could be taken, with regard to either the theory or the claim of the patentees, to be substantially the same as their cone; nor was he satisfied that the isolator of the patentees, which they nowhere described except by saying that it was to be preferably of a bad heat-conducting material, could be said to have been taken by the defendants, who merely employed a shaft of the ordinary length, material, and thickness, of the well-known long-shaped form of bunsen burner in common use before the date of the plaintiffs' invention. This really disposed of the case. But he might observe, with regard to the expert evidence adduced on behalf of the plaintiffs, that, in his opinion, it was sought, by a process of scientific reasoning, to unduly enlarge the real scope and meaning of the patent, by showing that similar results to those obtained by the invention might also be arrived at without taking the cone and insulator of the patentees, provided that any form or kind of projection was used on any part of the shaft of an inverted bunsen burner between the flame and the nipple of the burner—in fact, by way of example, that the figure shown in the specification would produce the desired results, even if the cone were wholly removed, because of the projection shown on the shaft above the cone, that projection being nowhere referred to in the body of the specification. To his mind, this method of extending a patent was not justifiable; for, assuming, as he did, that the patent was valid and useful as set out in the specification, the subsequent discovery, or ascertaining by scientific investigation, theory, or experiments, that the patentees might have discarded their combination, and might have obtained substantially the same beneficial results by merely putting a projection, not being a cone, immediately below the nipple, would not justify the plaintiffs' claim to have this projection held an infringement of the patent. What he might call the expert and scientific method of trying to extend the scope of the patent was well exemplified by the application which had been made to have further experiments carried out on the plaintiffs' behalf, with a view of showing that the defendants' umbrella-shaped projection only acted, as its shape suggested, as a heat retainer, to so limited an extent that it ought to be treated as a mere device to throw off the heat, and therefore as being substantially like the patentees' cone, though in a somewhat different position. This application was, as he thought, rightly rejected. Apart from any other objection, it would almost certainly have led to a long cross-examination and more scientific evidence on both sides of a conflicting character, with the result of further obscuring the real nature of the patented invention, and of the issue as to infringement. In his opinion, the appeal must be dismissed, with costs.

Lord Justice COZENS-HARDY said he quite agreed that the appeal failed, and he had very little to add to what had been said. The question of the validity of the plaintiffs' patent did not directly arise; and he should assume that it could not be attacked on the ground of

* See "JOURNAL," Vol. XC., pp. 515, 591.

novelty and subject-matter, if properly construed. The defendants denied infringement; and Mr. Justice Joyce had decided this issue in their favour. The specification, though short, was not easy of construction. The patentees conceived that, in order to make an inverted bunsen burner work satisfactorily, for incandescent gas lighting, it was necessary to prevent, as far as possible, the heat from the nozzle, where the flame was, from travelling up the shank of the bunsen burner to the nipple and air-holes. The striking-back of the flame was a well-known mischief. To diminish the heat by conduction, the patentees provided an isolator or insulator; to diminish it by convection, they provided a deflecting cone on the isolator, which the drawing showed close to the mantle. The reason of the thing seemed to require that the deflector should be as low as possible, in order to protect the whole length of the shaft from the lapping or licking of the flame; and it was worthy of notice that the patentees made no claim to what might be called the second deflector shown in the drawings, and placed at the extreme upper end of the insulator. The defendants had no definite cone, nor had they any contrivance on the lower part of the shaft. They had what he might describe as an umbrella, just below the nipple and air-chamber, and substantially in the same position as what had been called the upper gallery in the drawing. There was nothing to prevent hot air from reaching this umbrella. It was not, and did not act as, a deflector, in the sense or for the purpose contemplated by the patentee. The defendants sought to make the contents of the tube—the mixed gas and air—hot; and they proceeded on the regenerative theory, which was directly opposed to that of the plaintiffs. In his opinion, the defendants had not infringed, because they had not taken the deflector, which was an integral and essential part of the plaintiffs' combination. He also felt great doubt as to whether the defendants had any insulator. The brass tube of an ordinary bunsen burner could not fairly be said to isolate the burning head or nozzle from the upper end of the same tube; and it was an unnatural use of language so to describe it. There was no interposed material, and the tube itself did not isolate one end from the other, even though a thin brass tube might have greater effect, in respect of coolness, than a thicker tube of brass, or than a thin tube of some other metal. They had been strongly urged by Counsel on the plaintiffs' behalf to witness some experiments which it was stated would satisfy the Court that certain theories advanced by the scientific advisors of the appellants were correct. But no such evidence was given in the Court below; and it would not have been right to embark on any discussion of this kind in that Court. To do so would involve not only a cross-examination of the supporters of the theories, but the examination of equally eminent scientific witnesses who did not, or might not, assent to them.

Mr. ASTBURY (for the appellants) asked if their Lordships would grant a certificate that the validity of the patent had come in question; but they declined to do so.

HIGH COURT OF JUSTICE OF IRELAND.

(*Before the* MASTER OF THE ROLLS)

Thursday, Feb. 15.

Alliance and Dublin Consumers' Gas Company v. Council of the County of Dublin—The Steam-Roller Question.

In the Chancery Division to-day, application was made, on behalf of the plaintiffs, that they should be at liberty to serve a writ for the purpose of sequestrating the property of the defendants for contempt of Court, in wilfully disobeying an order of the Court made in 1900, as affirmed on appeal,* whereby the County Council, and their servants, agents, and workmen, were restrained from using any steam-roller upon any road under which the plaintiffs' gas-pipes had been laid, so as to break or injure them, regard being had to what at the time of laying the pipes was the ordinary traffic, and to their reasonable means of repairing and maintaining the road.

Mr. RONAN, K.C., Mr. GORDON, K.C., M.P., and Mr. PIM (instructed by Messrs. D. & T. Fitzgerald) appeared for the plaintiffs; Mr. T. M. HEALY, K.C., M.P., and Mr. J. J. CLANCY, M.P. (instructed by Mr. W. J. Shannon), represented the defendants.

Mr. RONAN, in opening the case, read the order of the Court of Appeal confirming the judgment of his Lordship. Small matters of detail regarding the breakage of these pipes had been raised by the affidavits of the defendants. But there was one fact which was clear throughout—that for close upon thirty years (in some cases for twenty years), the gas-pipes stood the ordinary traffic on the roads; and that they would practically stand this ordinary traffic still if it were not for the steam-rollers. Counsel read a number of affidavits in support of his application. Mr. F. T. Cotton, the Secretary and Manager of the Company, stated that since the order of 1900 many of the mains and service-pipes had been fractured by the steam-rollers of the Council. He also set forth the protests and remonstrances of the Company, and the payments made in regard to certain of the damage by the Council; and, in conclusion, he submitted that, in using the steam-roller in the way the Council did, they were guilty of contempt of the order, and were exposing certain places to risk of explosion and serious injury to houses in the immediate vicinity of the roads under which the broken mains lay, as well as great danger of loss of life owing to the percolation of gas from the broken pipes. To illustrate the danger of such breakages, Counsel read the affidavit of William Cunningham, the lodge-keeper to Mr. R. W. Jameson, of Campfield House, Dundrum, in which he stated that, owing to a break in the main, his house became filled with gas, and he had to keep windows and doors open all night. Counsel also relied upon the affidavit of Mr. Eustace W. Carroll, the Superintendent of the Distributing Department of the Company, who gave a description of the work which they had to undertake in order to discover and remedy the injuries done to the pipes. The Council relied on the affidavit of Mr. William Collen, the County Surveyor, who stated that previous to the injunction of 1900 he was under the impression that the Council were not liable for any damage to pipes or mains which might be laid under the surface of public roads, provided they carried out the steam-rolling with the usual precautions. Since the order was made, he had inquired into all cases of damage, and had been ready to recommend them to the Council for payment, unless he found that the mains and pipes had been improperly laid. Having dealt in detail with the allegations made by the Company, Mr. Collen said that about 75 miles of road had been steam-rolled each year since 1900. Practically all the complaints of leakages came from about Dundrum; and he submitted that had the pipes there been properly put down, no injury would have resulted. Counsel said that, despite the fact that the Courts had granted an injunction to the effect that the Council should not use these rollers so as to injure and break the mains of the Company, they persisted in doing so, and the Company, therefore, had no alternative but to take the present proceedings.

Mr. CLANCY replied on behalf of the defendants, who, he said, were willing to do all the Court wished. He submitted that their property could not be sequestrated while they were willing to pay for any damage done to the mains, and that no such order could possibly be made by the Court.

The MASTER OF THE ROLLS: How otherwise has the Court power to enforce its decrees?

Mr. CLANCY said that up to the year 1904 the Company had accepted compensation. He then dealt at length with the allegations made on behalf of the plaintiffs.

Friday, Feb. 16.

On the resumption of the proceedings to-day, after hearing further speeches by Counsel,

The MASTER OF THE ROLLS gave judgment. He said he had already intimated that there was a case for compensation in whole or in part. His present view was that, with regard to a breakage at Coolnahinch, the plaintiffs had not proved their case; but they had done so in regard to the others. Regarding these places, he would have to refer the matter to Chambers for an inquiry as to compensation in case the parties did not agree; and he did not see why they should not.

Mr. HEALY said they would agree.

The MASTER OF THE ROLLS said the application was for a writ of sequestration, which was equivalent to a writ of attachment in the case of a private individual; but it was not usual to give such a writ if compensation in money could be made so as really adequately to fulfil the ends of justice. He was satisfied that there was a violation of the injunction, but that there was no intentional violation of the obligations of the Council, who had used their steam-rollers to the great advantage of the public. The plaintiffs were entitled to compensation in respect of the instances he had mentioned; and if the money was paid within a week after the fixing of the sum, there would be no rule on the application. The Council must pay the costs. At the close of his judgment, his Lordship pointed out that the Court of Appeal did not indicate the opinion that steam-rolling should be stopped, but only limited it to cases where injury would be inflicted where the pipes had been properly laid, having regard to the traffic at the time.

The Action Against the Portsea Island Gas Company.

In the Chancery Division of the High Court of Justice on the 9th inst., Mr. Justice Swinfen Eady had again before him the motion for an injunction, applied for on behalf of Messrs. Tottenham and Broadway to restrain the Portsea Island Gas Company from polluting a stream flowing through their land by effluent from the gas-works (see *ante*, p. 362). Mr. Eve, K.C., representing the plaintiffs, said that he understood the parties had agreed to take an order until judgment or further order in the terms of the first part of the notice, and the only question was as to the length of time for which the injunction should be suspended. His Lordship asked whether the parties were going to treat the motion as the trial of the action. Mr. Eve said they could not do so, as there were other questions. His clients were perfectly willing that the defendants should have a reasonable time; but they asked for six weeks, which the plaintiffs thought was unreasonable. He proposed that the injunction should be suspended for some short time, which would not prejudice the defendants making an application for an extension. Mr. Russell (who, with Mr. Danckwerts, K.C., appeared for the defendants) said the only difficulty was that the alterations proposed involved a considerable amount of digging, which must take time. He asked for a suspension for four weeks. Mr. Eve said he would assent to this. The injunction was accordingly granted until the trial on the terms agreed; but its operation was suspended for four weeks.

A Novel Gas-Meter Case.

Last Wednesday, at the Belfast Summons Court, the adjourned case in which Charles Woodside was summoned by the Corporation for having interfered with a gas-meter and with fraudulently using gas (*ante*, p. 363), came on for hearing. The allegation was that the drum inside the meter had been pierced with holes, thus allowing gas to pass without being registered. Several witnesses were called on both sides; those for the defence stating that no gas was burnt until a new meter was put in. Mr. Hodder, one of the Magistrates, in giving the decision, said he believed that gas was used; but whether it was fraudulently used or not, would depend very much on whether the parties knew that the meter was in a damaged condition. He thought that the summons was not sustainable in point of fact. Dealing with the other summons for maliciously injuring the meter, Mr. Hodder said he believed the meter had been maliciously injured; but there was no evidence to show who did it. He thought that the prosecution was weak in this respect—that if it was done maliciously, and done maliciously for the purpose of burning the gas of the Corporation free of charge, there would have been some evidence of a conclusive character that the gas was used continuously. On the whole facts of the case, the Magistrates would adopt the course of not dismissing the case on the merits, but of dismissing it without prejudice.

* See "JOURNAL," Vol. LXXV., pp. 752, 815, 1733; and Vol. LXXVI., p. 100.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the City Terminus Hotel, Cannon Street, E.C., last Wednesday—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) read the notice convening the meeting, and also the minutes of the last ordinary meeting. The seal of the Company was then affixed to the register of proprietors, and the report and accounts for the six months ending the 31st of December, which have already appeared in the "JOURNAL," were taken as read.

TRIBUTE TO THE LATE SIR WILLIAM MAKINS.

The CHAIRMAN: Ladies and gentlemen, before moving the adoption of the report and accounts, I wish to say a word or two in reference to the loss our neighbours, in whose district we are now situated, have suffered by the death of their Governor, Sir William Makins, and to express the sympathy of this Board and of this meeting at the loss the Company and his family have sustained. Sir William Makins and I did not always see alike. But it is a great satisfaction to me and to my colleagues here to feel that during the latter part of his life the two Companies acted thoroughly together; and the result was such a success last session, in dealing with the London County Council, as could not have been expected had we not pulled together. That *entente* was really due, I think, more to Sir William Makins than to anybody else. There was on one occasion danger of its being broken. But he took care that it should not be; and therefore I feel it due to him to say that. I wish also to say that he was always the courteous gentleman. He never lost his temper; and conducted the business of the Company as he honestly believed in the best manner, according to his convictions.

THE REPORT AND ACCOUNTS.

I have now to move: "That the report and accounts now presented be received and adopted, and the report entered on the minutes." Fortunately, it is not necessary to weary you by giving long strings of figures, because in our report and accounts we furnish as much information as possible—the accounts being supplemented by the report, which puts the position of the Company very clearly, I think, before you. If in connection with the accounts you will look at the first and fifth paragraphs, you will find all that is necessary in regard to the position of the Company. It is therefore needless for me to take up your time, especially as there are a good many matters of great importance to bring before you.

THE PURCHASE OF MONAZITE.

But while on the subject of accounts, there is one item which needs some special notice. In the balance-sheet you will see the last item is "Monazite sand suspense account, £24,139 15s." Now, that is a big figure. It was explained to you at the last meeting what we had done; but I may shortly give a *résumé* of the position. The incandescent mantle has enabled gas to take up the premier position as an artificial light. Perhaps it will be said that I am not an impartial judge; but I have looked at the thing all round, and, so far as I am able to judge—and I try to judge fairly—there is nothing can touch gas with the incandescent mantle. Well, up to four years ago it was in an unsatisfactory position. There was one Company that had the patent; and they were always at law with infringers. The price of mantles was very high; and in 1902 this Company, in association with thirty or more other companies and municipalities supplying gas, raised a fund and expended about £3000 in dealing with the question. This, at any rate, put an end to all the legal squabbles; and the result was that mantles which had previously been very dear were made cheap in England, as they had been for years in Germany, and practically free trade in mantles was established. Since then the use of mantles has gone on increasing in this country. As stated in one paragraph of the report, about 80 per cent. of our consumers now use the mantle; but very few of them employ it exclusively. If the mantle is used exclusively, I believe I am not wrong in stating that the saving in the consumption of gas is not less than 40 per cent.; but in those cases where they use it partially, we find there is a saving of 21 per cent. in a number of average accounts taken at random all over the district. Well, this accounts, and more than accounts, for the small increase in the consumption of gas. We have been accustomed to an increase of 5 or 6 per cent; whereas now it has come down to 1 or 1½ per cent. But this is more than accounted for by the great increase in the use of mantles. Your Directors have adopted the policy of pushing the mantle; and I doubt if there is any company in the country that pushes it as we do. Therefore you must not be surprised at the small increases at present; but it is making the position of the Company absolutely secure. Well, so far, so good. But then came another difficulty. We then discovered that the material from which mantles were made was entirely in the hands of a "Convention," as it is called. Four chemical manufacturers owned the monopoly of the article known as thorium, from which mantles are made. The mineral from which thorium is obtained is known as monazite; and this also was in the hands of two men. The greater part of this mineral had, up till quite recently, been brought from Brazil. We regarded this position as very unsatisfactory. The price of thorium had then gone up from 30s. per kilogramme—a kilogramme being rather less than 2¼ lbs.—to 40s. and 50s.; and there seemed no reason why it should not go up to any other figure. If it had done so, we should have had to purchase mantles whatever the cost might be; because, having once started with the mantle, we must go on with it. We had induced nearly all the parishes to adopt the incandescent system, and we had fitted up the lamps with these burners; and if there were no mantles, the burners would all have to come out, and we should have to go back to flat flames, a most unsatisfactory position. Well, the Directors were not content to rest in that precarious position; and they looked about for some means of securing themselves against such a catastrophe. They thought of purchasing thorium; but the price was put up, and made it impracticable. We then thought of getting a Brazilian concession, but could not do it, as our agent was not successful. Then an offer came for a property containing monazite in North Carolina, and the Directors purchased it. We sent out machinery which is now in full working order—well, not quite, because some addition had to be made. But now there is a new development. We no sooner are ready to produce monazite sand than the Thorium Convention drop the price from 53s. to 27s.—the price of 53s. being less 7 per cent., and of 27s. less 3 per cent.—which is very little more than the bare cost of manufacturing the article. Well, ladies and gentlemen, the Directors have this satisfaction, that they have attained the object at which they aimed—of getting a supply of thorium at a reasonable and cheap rate, and thus securing the Company from the anxieties which pressed upon us under the old condition. Thorium is now, not only for us but for the whole British gas industry, reduced to a price at which the best mantles can be made at a very low figure. But there is our £24,000 in North Carolina. Well, I am prepared to say this, that if we had been told two years ago that by the expenditure of £24,000 we could make the position of the Company secure, there is not a man on the Board but would have said: "Do it." At any rate, the money is not lost; the property is there. I do not think we can work our monazite to pay us to produce thorium at the price at which it is now sold; but then let us keep it. The price of thorium is not going to remain at this 27s.; the reduction is only for this year. The manufacturers have sold out all they possess; and they have distinctly stated that the reduction is only to be for this year. The Directors of this Company have purchased a quantity of thorium and stored it, in order to protect themselves against future contingencies. Then, when the price rises, there is our store of monazite in North Carolina to be brought into use for the manufacture of thorium; and we hope, in one way or another, the British gas industry will be safe in regard to the supply of mantles.

THE SUPPLY OF COAL.

Proceeding from this, I have to speak now of another very important matter—the question of coal. The coal we use is what ordinary people would say was exceedingly inferior; they would call it dirt and rubbish. The greater part of the coal that gas companies employ is a soft coking coal which will not bear carriage; and at least 60 or 80 per cent. is mere dust. Now, I have here in these bottles [indicating some upon the table] samples of the coal. One of them contains a fair average sample as we get it. If you were to place it on your fire, it would put your fire out. We have sifted part of it, and here in this other bottle is the 62 per cent. of this very fine dust stuff. Nearly all the lumps go easily into the bottle—in fact, it all looks of that small character. Now, the gas undertakings in this country are the mainstay of the coal-owners who own this sort of coal. The only other use, to any extent, to which it is adapted is for the manufacture of coke. They depend upon us; our custom is perfectly regular from year to year. By us they live. When there is a little spurt in the iron trade, up goes the price of coal; and no coal rises so much in price as gas coal. In 1900, it went up from 8s. to 16s. per ton in the Tyne, for no reason whatever except that there was a little extra demand for the manufacture of coke for iron-making, but a demand that they were perfectly able to supply. People talk about the coal famines. I am old enough to remember what was known as the coal famine of 1872. Prior to this, the price of coal was regular, as far as I can recollect; and my father and myself go back to 1839. It varied not more than 3d. per ton from year to year; and gas companies knew where they were. But in 1872 there was a great spurt in the iron trade; and the price of coal went up from 6s. to 20s. per ton free on board in the Tyne, and upset the gas industry all over the country. It took some years to get back. Then, in 1890, there was another similar result, but not so bad; the price went up to 12s. or 13s.—an advance of 5s. In 1900, there was a jump of 8s. The price went up in 1899, I think, 1s. or so to 8s.; then from 8s. to 15s.; and now there is a boom in the iron trade, and there is a probability, a possibility, that something of this kind may happen again. Let me tell you there has never been a coal famine. There was not in 1872, and never has been since. The only thing that has been has been a panic. Now a word to show what we can do even with an absolute stoppage of coal. In 1892, there was a strike of the Durham miners, which lasted three months. This Company were entirely dependent on Durham coal; and what did we do? We got supplied from other sources. That three months' supply of coal we obtained elsewhere. We got nothing from Durham, but some from Lancashire, some from Yorkshire, some from South Wales, some from Germany, and one cargo of 3000 tons from America. We supplied ourselves with coal without any difficulty for that three months at an extra cost of £7000. Now, I am saying all this because gas directors are men who very easily run into panic. I am afraid a good many of them do not understand the position. They say: "Oh, coal is going up, we must buy; buy all you can get; never mind a shilling or two advance; buy, buy." And the coal-owners—I do not blame them—take advantage of it, and they get an extra shilling, and then they get another shilling, and up it goes. Now, what I have to say to gas people is: "Do not be frightened; do not be in a hurry. Let the coalowners know we are not going to be fleeced again in this way. There is one company with which I am acquainted which, when there was a probability of Durham coal going up, bought their supplies entirely elsewhere and left Durham alone altogether; and I should say to all gas companies: "Do not be frightened, do not be bullied into giving these high prices." A little increase may be fair. I do not object to that; but to put up the price anything like in the past years is disastrous to the gas industry.

RATING.

There is another point I want to speak about, and that is rating. Last year was the year of the reassessment of London—the quinquennial reassessment. Every five years we have to go through the mill; and we expected that the rating authorities would be reasonable. Four different rating surveyors were employed by the different Unions to rate the Company's property. Three of them were reasonable and fair;

and we were able to settle with the Unions which these men advised on reasonable terms. There was no reduction in any case, in some there was a moderate increase. The rating of gas companies is a totally different thing from what it was some years ago. The principle—or the want of principle I ought to call it—on which they act is that they imagine or suppose a tenant—they create what they call a hypothetical tenant; and by most intricate calculations and manipulations of the figures, they arrive at a certain amount of rent which they think this hypothetical tenant would give. The basis of this rating is the profit earned; and the *crux* of it is to determine how much of this income belongs to the landlord and how much to the tenant. Of course, you know in an ordinary business a tenant pays a certain rent for his premises. Then he has to provide a certain amount of money as working capital and to get his stock; and all the income he derives from this capital and his labour is his own profit. All that he is rated on is the rent he pays to the landlord. Well, these rating surveyors divide the capital of a gas company between landlord and tenant. All the meters are treated as the tenants' property. These and other things the tenant would have to find if our business were let from year to year; the incoming tenant would have to buy the meters and other articles of that sort, stoves, and various other things of the outgoing tenant. Well, by the adoption of the slot meter the tenant's capital is largely increased. As is stated in our report, about a million-and-a-half has been spent in the last ten years; and quite a million of that has been in fitting up these slot meters, which is tenants' capital, and therefore not rateable. The greater portion of the increase of our business in the last five years has been in this direction; and therefore, instead of an increase of rating, we ought perhaps to have had a reduction. But we wished to deal fairly and reasonably with these people; and we would not ask for a reduction in any case. In one instance, the Chairman of the Assessment Committee actually thanked me for the fairness with which the Company had dealt with them. But there is one rating surveyor who takes a very extravagant view. The rate in the various parishes where the works are situated is calculated on the structural value of the works. But where there are no works, we pay very heavy rates in every parish where we supply gas; and that is based on the gross receipts. The five or six Unions with which we settled agreed to the assessment being at the rate of 7½ per cent. on the receipts; but this other gentlemen, who has to do with three or four Unions, advised that the rateable value ought to be 12½ per cent. on the receipts. The effect of this was to increase our assessment by 50 per cent. The assessment was £34,000 five years ago in a certain Union, it was to be over £50,000 now, which was an utterly absurd thing. We tackled him about this. I said: "Why did you put into the minds of your people that they should get such an increase as this, because that renders it extremely difficult to bring them down to reasonable figures." "Oh!" he said, "that is a sporting figure." A sporting figure! But it does the mischief. It led the rating authorities to feel "Oh! here is a Gas Company which has been getting off in past years with a great deal too little. We are now advised to put them up 50 per cent." The Parish of Camberwell was one of those which acted fairly. They were advised to put up this year by 50 per cent.; but they listened to what we had to say, and we settled with them. But there was a meeting of the representatives of three other Unions; and they agreed to stand out for 9½ per cent.—an extravagant figure. What we said to them was: "We have agreed with two-thirds of our parishes at a certain figure; we cannot go beyond it. We have agreed with them at 7½ per cent. on the receipts; and if we were to give you 9½ per cent., it would be an injustice to them. They would be called upon to make up the loss which we sustained by you." We told them we could not do it; but they put their heads together and they have arranged to fight. Now, I will give you a concrete instance. I happen to be connected with two Companies supplying the Borough of Lewisham—the South Suburban is one and the South Metropolitan the other. Each supplies about half the borough of Lewisham. Both Companies pay the same dividend, and require the same amount of profit within a fraction of a penny per 1000 feet to pay it. Well, I attended for both Companies the same day before the same Committee; and this extraordinary thing happened. The South Suburban Company was settled at about 5 per cent. on the receipts. The Rating Surveyor put it at 5 per cent., and the Company's Surveyor put it at 4½ per cent.; so that practically there was no difference, and it was settled at that. This same Rating Surveyor for the Borough of Lewisham put the South Metropolitan Company's rating at 12½ per cent., or two-and-a-half times as much as he did the other. The Committee settled with the South Suburban Company at 5 per cent., but refused to settle with the South Metropolitan Company except at 9½ per cent. The Company's Rating Surveyor said 4½ per cent. and theirs 5 per cent. was right in the case of the South Suburban Company; but in the case of the South Metropolitan he made it 12½ per cent. The same Surveyor, acting for both Companies, made it 4½ per cent. for both; while the Borough Surveyor made it 5 per cent. for the South Suburban and 12½ per cent. for the South Metropolitan. Well, it is this that necessitates fighting. We cannot submit to it; and I go further and say that if we should be called upon to pay an excessive amount of rating for these three or four parishes, the only fair way would be to raise the price of gas in the parishes and let the others who have dealt with us reasonably remain unraised—it would be but a simple act of justice. We were almost forced to this on a previous occasion. I am in hopes, however, that we shall be able to prove the justice of our case; but it is very annoying to have to incur all this expense. One other point. I do not think there is any other article of common use rated so heavily as gas. I do not know how it may be with water, but the consumers of this Company pay about 7 per cent. of the price of gas in rates. Certainly nothing like 7 per cent. of the retail price of bread or meat, or groceries or draperies, is paid for rates We want gas rated fairly in order to reduce the price.

GASEOUS FUEL.

Now there is another thing I want to speak about. I will not take up much of your time with it—about gaseous fuel. We were the pioneers in getting permission to reduce the illuminating quality of our gas, because luminous gas is no longer necessary with the mantle. What the gas industry wants is power to supply gas that shall be most acceptable and most useful to the community—gas that will suit both those who use it for lighting, those who use it for cooking, and those who use it for power or other purposes. The first step has been to get a modification of the illuminating power. The next step is to get the testing of gas put on a fair and proper basis; and I am very happy to inform this meeting that (as is set out in paragraph 4 of the report) at last the testing of gas is on a satisfactory basis. It is such that an honest man can comply with the conditions without anxiety and without difficulty; and I can only tell you that for thirty years and more the reverse has been the case. With every desire to do their duty and to act honestly and well, it has been a constant and never-ending anxiety on the officers and foremen (and directors to some extent) of the gas companies to meet these absurd requirements which were no good to anybody. Now we have got a burner, designed by our Mr. Carpenter, that is satisfactory, that develops the light that is obtained from the gas; we have got a sulphuretted hydrogen test that is reasonable; a test for ammonia which was never any use (one company was fined £400 for a slight failure in this matter) is abolished, and the restriction as to sulphur compounds is removed. Well, what we want further is liberty to supply the gas that the consumers want; and the time will come when the question of nominal illuminating power will be a matter of no consideration at all.

CAPITAL.

While I am on the report, I might say a word or two about the capital. We are increasing our capital, and we are working as economically as we possibly can to keep down the expenditure in every reasonable way; but still it is going up. Now, we have issued another £100,000 of capital; and going on the principle that this Company have followed since 1890, of offering all new stock to the Company's consumers at the market price, we arrive at this: In these years 8263 consumers have purchased capital of the value of £1,127,000. There is a considerable advantage in this. In the first place, it makes friends; and in the second place, it is a means of distributing property. I have here an extract, which it will not take me more than half-a-moment to read, from Mazzini, the great Italian; and I think it is appropriate on the present occasion when so much is being said about the division of property. Mazzini said: "Among the essential elements of human life—such as religion, association, liberty—property is one. The first principle and origin of property is in human nature itself. It represents the necessities of the material life of the individual, which it is his duty to maintain. The principle of property is eternal; and you will find it recognized and protected throughout the whole existence of humanity. We must not seek to abolish property because at present it is the possession of the few; we must open up the paths by which the many may acquire it." Now that is what I think we are doing in issuing our capital in the way we do. We are making friends, and we are also helping in the direction of distributing property more equally. I see by our list that the numbers applying for small amounts were as follows: 135 for £5 of stock, 160 for £10, 37 for £15, 147 for £20, 179 for £50, and above this they are nearly all small numbers. You will say "Why do not shareholders have a chance? Since 1876 Parliament has deprived the shareholders of gas companies of any advantage from new issues of capital. It all has to be sold by auction or tender, or in the way we are doing it—at the market price; and the shareholders can buy stock in the market quite as cheaply as the consumers have taken this. The price was 130. The price in the market was about 132; but then in the market there is the dividend of 2¾ per cent. which is due. On the 130 there is no dividend at all; so that practically it is a balance.

CO-PARTNERSHIP.

Well, then, there is another point; and I think I may say now that there is so much said as to what is going to happen about property and other things, that we may take some credit for having gone in the right direction of distributing property and opening up the paths by which the many may acquire it. This is just the lines on which the shareholders of this Company have gone with regard to their employees. I feel it due to the shareholders to say this. It is true that the suggestion came from this side of the table; but in all the sixteen years since 1889 when we first adopted the principle of taking our officers and workpeople into partnership with us and giving them an interest beyond their salaries and wages in the prosperity of the Company, and ultimately making them shareholders it is due to the shareholders of this Company to say that a large part of the credit of this work rests with them. The shareholders of this Company have always sympathized with—always expressed themselves anxious to do what they could whereby the working people whom they employ should become owners of property, and they nearly all are now. Something like £300,000 is owned by our employees—in stock and on deposit, or in their own houses. Those are the people who will not become Socialists, and are not likely to be bitten with socialistic notions. I think, therefore, the shareholders of this Company may feel that, besides getting fair interest for their money, they have by opening up the paths by which the many may acquire property, done something to benefit the country at large. I have nothing more to say. I have taken up a great deal of your time; you have listened very patiently; and if there are any questions to be asked, I shall be only too glad to try to answer them.

Mr. ROBERT MORTON seconded the motion.

Mr. HOGARTH pointed out that the £80,000 now paid by the Company in rates was, in round figures, 5 per cent. on the £8,000,000 of capital of the Company; and he could not understand how the surveyors could approach the subject to bring out such different results as 4½ per cent. and 9 per cent. He agreed with the Chairman as to the desirability of showing fight over this question, and considered that the Board held a trump card by reason of having already settled with two-thirds of the parishes at the lower figure. As to the gentleman with a conscience of such an elastic character that he flew for 12½ per cent., he must be clearly shown that such an assessment was a gross injustice; and he hoped the Board would not for a moment give way to him. He said there was a fine point where the surveyors drew the line. If the

rates were levied on the net receipts instead of on the gross receipts, it would make a vast difference.

The CHAIRMAN: That 7 per cent. is on our gross receipts.

Mr. HOGARTH also observed that a question arose with reference to the occupation of the property; tenants being assessed not on their rental, but upon a reduction of 15 or 16 per cent.

The CHAIRMAN: A tenant who pays £100 a year rent is assessed at £84.

The resolution was then adopted.

The DEPUTY-CHAIRMAN (Mr. John Ewart): I have now to move, "That a dividend at the rate of five-and-a-half per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post." As you will have seen from the report, this dividend has not been fully earned. This has been entirely due to the fall in the value of residuals. Residuals have now begun to improve to some extent; but as against this, there is a matter the Chairman has alluded to of a probable increase in the price of coal. I think our experience has been that when the price of coal rises, the price of coke also rises; so that I hope we shall be compensated to some extent in this way. There is another alternative, supposing that this is not as satisfactory as we hope—there is always the possibility of raising the price of gas, which we can do without diminishing the dividend. Of course, this is a step which, as you can understand, we shall be very reluctant to take in the present severe competition, which is more likely to increase than diminish, owing to the various methods of lighting and power, more particularly electricity; but you may be quite sure that the Board will not resort to this except under very necessitous circumstances.

Mr. HENRY AUSTIN said he had a twofold pleasure in seconding the resolution. Firstly, he had helped to create the dividend; secondly, he participated in it; and, he might add, thirdly because of the distribution to 3765 employees, who took £4364 by way of dividend. They were all awfully radical when they were distributing other people's property, and very conservative when distributing their own; and no doubt the ownership of property by workmen did bring about Conservative instincts which gave solidity to all undertakings. Therefore, the workmen joined with the Chairman in thanking the shareholders for their generous way of dealing with them. They knew they could by their vote put an end to this distribution; but looking at it from the point of view of the workmen, he did not think they would.

The resolution was carrried unanimously.

The CHAIRMAN: I have now to move: "That Captain Thomas B. Heathorn be re-elected a Director of this Company." He is our oldest Director, and a very good friend to all of us and to the Company. I have therefore much pleasure in moving his re-election.

Mr. RICHARDSON seconded the motion, which was carried.

The CHAIRMAN: Now I will move: "That Mr. Edward H. Cardwell be re-elected a Director of this Company," I have much pleasure in moving this. Mr. Cardwell is a man universally liked by all of us. But he is a modest and retiring man, and I do not think he likes to be present when he is put up for re-election. However, I can only tell you we all appreciate him very much.

Mr. HEDGSON seconded the resolution, which was also adopted.

Captain HEATHORN: I am very much obliged to you for allowing me to continue a Director. I have been here many years now—being the oldest Director. Naturally, for reasons I need not go into, I take a very great interest in the Company. You could not put your money into any safer thing than this. It is about as good and honest a concern as there is in England; and I am sure any thinking man will be convinced that in the future it will be as prosperous a concern, because there is nothing goes on here at this Board or in our Company that can in any way militate against its prospects. I thank you again for re-electing me; and you may be quite sure I shall give my best attention to the interests of this Company.

On the motion of Mr. COPPEN, seconded by Mr. RICHARDSON, Mr. Charles Mortimer was re-elected Auditor.

Extraordinary Meeting.

The CHAIRMAN: We are promoting a Bill; we seem never to get out of Parliament. Some years ago we bought additional land at East Greenwich, to provide for the sale of gaseous fuel in London, which we hope is coming, and we needed a little more river frontage. When we bought the land, the people who had the frontage said they could not spare it; they could not do without it. Now it turns out that they can; for last year they offered to sell it to the Administrative County of London Company for electric power purposes, proving that they did not want the land themselves. We are, therefore, making application to Parliament for power to purchase this land. Clause 3 is the essential clause: "Subject to the provisions of this Act, the Company may, for the general purpose of their undertaking, purchase and acquire all or any of the lands in the Metropolitan Borough of Greenwich which are delineated in the deposited plan described in the deposited book of reference." Well, these lands extend to about 13 acres; and they increase the river frontage to land which we already possess. I have to move:

That the Bill now submitted to this meeting, intituled 'A Bill to empower the South Metropolitan Gas Company to purchase lands, and for other purposes,' be, and the same is, hereby approved, subject to any amendments which may be made therein by Parliament and approved by the Directors.

Mr. ROSTRON seconded the resoluton, and it was adopted.

The CHAIRMAN: That closes the business of the meeting, and I thank you for your attendance here.

Dr. DRYSDALE proposed that the very best thanks of the meeting be given to the Directors for their admirable conduct of the affairs of the Company.

Mr. RICHARDSON seconded the resolution, which was carried.

The CHAIRMAN: Well, I do not know that I can do more than thank you; but remember that word "thank you" is a real and sincere one, because we feel that, in moving and carrying this vote of thanks, you mean what you say. We thoroughly appreciate it; and we hope we shall be spared many years to meet you. I have now to move a very hearty vote of thanks to the officers and employees of the Company generally. As to our chief officers—Mr. Carpenter, the Chief Engineer, and Mr. Bush, the Secretary—I cannot say too much for them, and not for them alone. That being so, I will not try to enlarge on the point.

The DEPUTY-CHAIRMAN seconded the motion, which was carried.

Mr. CHARLES CARPENTER thanked the meeting on behalf of the engineering staff.

Mr. BUSH also thanked the meeting, and observed that the employees always felt, when a vote of thanks was proposed from the chair, that it would not have been proposed unless it was deserved. As allusion had been made in the report to the expenditure of capital, he would like to say a few words on this important subject. Probably during no time of the Company's history had so much money been spent as in the years 1894 to 1905. This was owing to the exigencies of the Company's business. He would take first the slot-meter business. This, it was true, started in 1892, but did not get into full swing until 1894; and in connection with that, one way and another, he thought considerably over £1,000,000 had been spent. Next came the purchase of land at East Greenwich. Probably this cost nearly £100,000; and rather more than three years ago the Company purchased a tar-works at a cost of about £80,000. With all this expenditure, one would have expected to see a rise in the rate per ton of coal carbonized; but whereas in 1894 it was £4 11s. 9d., in 1905 it was down to £4 5s. 10d. This, he might say, was owing entirely to their Chairman. His had been the directing hand. He had regulated expenditure, and, if he might use the expression, had sat on the cash box; and the wish he would express with great earnestness was that for many years he might be spared to rule over the fortunes of the Company. At the meeting of the Gaslight and Coke Company, the Chairman of that Company alluded to a very interesting experiment that they were about to try in the appointment of lady gas inspectors—the object being that they should visit the houses of consumers and instruct other ladies how to use gas-cookers. They must not be indifferent to changes going on about them; and doubtless this was a very good move to get in touch with consumers and ascertain their requirements. But these ladies, where would they stop? We had lady doctors, and lady barristers were talked of, and there were lady secretaries all over the kingdom; so that at any moment his own position might be assailed. He had often noticed the presence of ladies at the meetings; and there were a great number present that day.

The CHAIRMAN: We are very glad to see them.

Mr. BUSH: Very, indeed, Sir; and it would not surprise me one day to receive a letter of this kind from a lady shareholder: "At the next vacancy on the Board it is my intention to offer myself as a candidate."

COMMERCIAL GAS COMPANY.

The Ordinary Meeting of this Company was held on Thursday at the Cannon Street Hotel, E.C.—under the presidency of the Chairman, Mr. W. G. BRADSHAW.

The CHAIRMAN, when affixing the seal of the Company to the register of shareholders, said it might be of interest to state that the number of proprietors was now more than 2350.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting and the minutes of the previous meeting; and the report and accounts were taken as read.

The CHAIRMAN: I have the pleasure to move: "That the report and accounts be received, adopted, and entered on the minutes." We are very glad to meet you again to-day, and to have a satisfactory statement of accounts to present. The past half year has not been an eventful one in the history of the Metropolitan Gas Companies, except in so far as it saw the transition to the new state of affairs introduced by the London Gas Act of last session; but it has been successful so far as this Company is concerned, because the accounts which we present to-day show that the Company has made steady progress, and for the first time since we reduced the price to 2s. 5d. per 1000 cubic feet, we have earned the dividend which we recommend for payment.

THE LONDON GAS ACT.

When we met in August, the London Gas Bill had passed both Houses, aad was only waiting the Royal Assent. By the courtesy of the London County Council, the clauses which relieved us from the necessity of removing the sulphur compounds were allowed to take effect from the end of September, although the Act did not come into operation until Jan. 1. The experience of the last four-and-a-half months enables me to say that it has been proved that the change has not injured the consumers in the slightest degree, while it has afforded a welcome relief to our Managers from a useless and unnecessary anxiety. I am glad to say that the three Metropolitan Gas Companies were unanimous in submitting to the Gas Referees a new argand burner to be used when testing gas. It is one which was patented by Mr. Charles Carpenter, the able Engineer of the South Metropolitan Gas Company; and it has been adopted by the Referees. I think we are all agreed that this new burner—which has an adjustable air supply—does substantial justice to all grades and qualities of gas; and therefore I am of opinion that we may confidently hope that this long and much-vexed question of testing for illuminating power is now settled for many years to come. This sees the end of a long and arduous fight. Another satisfactory feature is that in the notification of the Gas Referees they manifest an earnest desire to administer the Act in an impartial spirit. I hope, therefore, I may say that we shall not have to expend large sums of money in expensive parliamentary proceedings for a long time.

THE ACCOUNTS.

Turning to the accounts, I will go briefly through them, calling attention to points which may interest you, or which seem to require some explanation. First of all, I will give you a summary of the half year. If you will look at the left-hand bottom corner of the accounts, you will see that the last figure but one—the balance of profit for the half year—amounts to £61,030. This is £7519 in excess of the balance of profit for the corresponding half of the year 1904, when it

was £53,511. If you deduct from the balance of profit £61,030, in Account No. 5, the sum of £8271, which is the aggregate of the first two items—the interest on the debenture stock and interest on temporary loans—you will have left £52,759. The dividend which we recommend, at the rate of £5 4s. per cent. on the 4 per cent. stock and 5 per cent. on the 3½ per cent. stock, will absorb £51,525, leaving £1234 as surplus profit after paying interest and dividend, which will be added to the £16,239 brought forward from the last half year, and make a sum of £17,473 to be carried forward to the credit of the current half year.

THE SURPLUS.

I think that is very satisfactory; but I confess that I should like to see the sum carried forward grow to larger proportions, because it ought to be a security, on the one hand, to the consumer that the price of gas will not be raised except under abnormal circumstances; and, on the other hand, it ought to be a security to you that your dividend will not be lightly interfered with. Our reserves compare favourably in amount with those of the other two Metropolitan Gas Companies; but I believe it is in the interests both of the public and of the Company that the reserves should be built up in times of prosperity, so as to be available when things are not so prosperous.

IMPROVEMENT IN PROFITS.

If you will turn to the revenue account, No. 4, I will show you how the improvement in our profits has been brought about. In the first place, we sold nearly 80 million cubic feet of gas more than in the corresponding half of 1904; the receipts from this source being £184,628 in the six months under review, and £175,876 in the corresponding half of the previous year. That is an increase of £8752 from this source. Then the rental from meters and stoves shows an increase of £2958; but the income from residual products exhibits a small decrease of £1848, which was wholly due to a falling off in the price of coke. Coke produced less by £2816, though we actually made 5000 tons more. Taking into consideration other small items on that side of the account which do not call for special attention, our receipts were more by £9731. On the expenditure side of the revenue account, we sold nearly 80 million cubic feet more gas; and in order to make it we used 8183 tons of coal more, though we employed less oil. But coal and oil cost £2737 less; and this saving was due partly to the fact that coal was slightly cheaper, and partly to the satisfactory working of the Company's steamers, which gave us a saving in the cost of carriage of coal from the North into the Thames. Then in distribution—that is, taking the gas from the works to the consumers—the cost was £4477 more. I ought to explain, however, that the increase is more apparent than real, because we charged to revenue a number of alterations which might possibly, if circumstances demanded it, have been carried to capital. Then rates—rates always increased. They were £1181 more. Management was £584 more; and the £584 of increase there is due entirely to the extra cost of collecting coppers from the additional number of coin meters. Law is £500 more. We included there part of the cost of the parliamentary proceedings in the last session. Altogether our expenditure was £2212 more on balance. If you deduct this £2212 from the increased receipts, you get the improvement of £7519 to which I alluded.

THE CAPITAL ACCOUNT AND THE CONSUMERS.

I have little to say with regard to the capital account. Our expenditure under this head was £23 599; and you will notice that none of it was spent on the works. It all went in providing additional stoves and meters for new customers; and I think that is a very satisfactory item. We have now 70,530 consumers; and of these 25,306 use ordinary meters and 45,224 use coin meters. During the half year, we fixed an additional 277 ordinary meters and 4803 coin meters; while during the whole of 1905, we obtained 363 more ordinary consumers and 9224 coin consumers. Now of our consumers 55 per cent. use stoves, as well as gas for illuminating purposes; and we are on the track of the other 45 per cent. I think there is room for a little improvement there; and I should like to see a considerable proportion of the 45 per cent. take stoves. We have already made a large effort in this direction, as is shown by the fact that during 1905 we fixed 8388 new stoves; and of this number 5041 were fixed in the second half of the year.

INCREASED SALES AND IMPROVED WORKING.

Now I said a few minutes ago that we had sold nearly 80 million cubic feet of gas last half year in excess of the corresponding six months of 1904. The exact figure is 79½ millions; and that is equivalent to an increased sale of nearly 5½ per cent. Now the South Metropolitan Gas Company had only an increase of 1½ per cent., and the Gaslight and Coke Company had an increase of 1·2 per cent.; and it is not very often that the Commercial Company has a better increase than the other two London Companies. This large increase is due to the additional number of stoves and coin meters fitted during the last few years. Then our make per ton shows an increase which is very satisfactory, because it indicates good work on the part of the men. The make per ton for the last half of 1905 was 10,750 cubic feet, as compared with 10,513 cubic feet in the corresponding half of 1904. During the half year, we sold at public auction £25,000 of 3 per cent. debenture stock; but the capital account at the end of the six months was still overdrawn to the extent of £29,170. I do not think I need take up any more of your time over the accounts. If there is anything I have left out that you would like to know, I shall be happy to answer any questions presently.

AN EXCELLENT POSITION—THE ONLY CLOUDS.

But you will like to have the assurance from us that we believe the Company to be in a perfectly sound and prosperous condition. Our works are in good order and thoroughly up to date; and I think the popularity and usefulness of gas is assured at this time. In fact, I do not believe we need fear any fair competition; for we are well able to hold our own with any existing forms of artificial lighting and heating. The only possible clouds I can see are due to the constantly increasing charge for rates and to the promotion of the London County Council (Electric Supply) Bill. As to the rates, we are victimized by them—and I use the word advisedly—in two ways. In the first place, they drive out our best customers from the district; and, in the second place, we ourselves, who have no voice in the expenditure of the money and in the election of those who make the rates, are mulcted in a sum which represents nearly 1½d. on the price of gas. This year, as you know, is the year of the Quinquennial Assessment. We found it necessary in two cases to appeal against the impositions of the Assessment Committee; and the cases are still pending. I should like, in regard to this matter, to say that our Engineer is enjoying the very able assistance of Mr. Henry Jones; and we are very much indebted to him for the amount of work he is doing for the Company in connection with the question of rating. As you know, there is no higher authority on this subject to be found than Mr. Jones. With reference to the London County Council Bill, that is to authorize the Council to supply electricity all over the Administrative County of London; and the necessary result, if the Bill was passed, would be that for some years at any rate they would have a deficit on revenue account which would have to be met out of the rates. The consequence would be that we should have to meet a competitor who was financed out of public funds; and if in his struggles to defeat us he made a loss, we should have to meet that loss in our rates. I think a more unfair proposition than that cannot be imagined. We are taking the necessary steps, of course, to offer most vigorous opposition to the Bill; and to this end, we are—following the precedent of the last session—combining with the other two Companies.

THE LATE SIR WILLIAM T. MAKINS.

Before I sit down, I must allude to the great loss which our colleagues in the Gaslight and Coke Company have sustained by the death of Sir W. T. Makins. A Director for 34 years, and Governor for 23 years, he presided over the Company with tact and ability; and we owe it in a large measure to his genial courtesy that last year the three Metropolitan Gas Companies were able to unite in their very successful parliamentary proceedings. An English gentleman of the best type, he was upright and honorable in his dealings, and endeared himself to everyone with whom he came in contact. We deplore his loss; and as we express our sympathy with his family and colleagues, we would wish to place on record our appreciation of his great services to the gas industry of the Metropolis.

THE REPORT ADOPTED.

The DEPUTY-CHAIRMAN (Mr. Walter Hunter): I am very glad indeed to second the adoption of the report, and would only add that the Gas Referees, who I feel can be trusted, have, when they had the power, done justice between the consumers and the Company.

Mr. WOOD: There is one matter I should like to refer to. I see that in account No. 8 you have the same amount of cannel at the beginning and at the end of the half year.

The CHAIRMAN: We have had that amount for years past. We do not use it; but it is very useful to have as a standby. It does not deteriorate; it is a very hard coal.

The resolution was then carried unanimously.

RE-ELECTIONS.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends at the rates of £5 4s. per cent. per annum upon the 4 per cent. stock and 5 per cent. per annum on the 3½ per cent. stock, both less income-tax, were declared.

The CHAIRMAN proposed, and the DEPUTY-CHAIRMAN seconded, the re-election of the retiring Directors (Messrs. T. Bevan, F. Green, and H. E. Jones); and this was agreed to.

On the motion of Mr. WILSHAW, seconded by Mr. HARSTON, the retiring Auditor (Mr. H. W. Gell) was also re-appointed.

Mr. H. E. JONES, after returning thanks for his re-election to the Board, remarked: I just wanted to say in this room, on this occasion, as I am a very old gas man, with what satisfaction I have heard our Chairman, with his usual good taste and proper feeling, refer to the loss suffered by the death of Sir W. T. Makins. As a gas director in London for many years past, I have had many points of difference with that gentleman. I am glad to remember that throughout the whole of these differences in views, our personal relations were always of the very pleasantest; and in no case was there any asperity in the discussions which took place between us.

VOTE OF THANKS TO THE STAFF.

The CHAIRMAN: I have pleasure in proposing a vote of thanks to the officers, staff, and workmen of the Company for their excellent services during the past half year. As you know, in every department of life the margin between success and failure is a very small one. It is just the extra amount of strenuousness put into work which brings success; and where this is wanting, success does not come. We are happy to bear our testimony to the excellent spirit which animates all ranks and classes of the employees of this Company. I believe they are all determined to deserve success, even if they cannot command it. With this vote I couple the names of Mr. Ellis and the Engineer (Mr. Stanley H. Jones).

The DEPUTY-CHAIRMAN seconded the motion, which was carried unanimously.

Mr. ELLIS: I can assure you that it is very gratifying to meet the proprietors every six months and find we have been able to give satisfaction. We endeavour to do so to the best of our ability; and it is pleasant to know that we succeed, at any rate to some extent. I have been used on these occasions sometimes to tell you of important law proceedings which cause great anxiety to those who are interested in companies like our own; but I am happy to say I have no story to tell this time. The half year has been calm and free from clouds; and there has been nothing to agitate us at all in that respect.

THE CO-PARTNERSHIP SCHEME.

It may interest you to know something about a matter which the Chairman has not very prominently referred to—that is, the profit-sharing or co-partnership scheme. It will be gratifying to you to learn that, in addition to the amount of money there is in the hands of the

Company, standing to the credit of the employees, as shown on the balance-sheet, in the register which was sealed when we began these proceedings there are 350 names of your servants who are now co-partners with you—are shareholders with yourselves. (Hear, hear.) It is also gratifying to know that these servants of yours have stock to the value of about £20,000 belonging to them. The scheme is therefore going very well; and I hope it will go still better.

Mr. STANLEY H. JONES: Mr. Bradshaw always covers the ground in putting the Company's position before you; and there is nothing that the officers can tell you in addition. The harmonious relations existing in all the ranks of your employees are most satisfactory. I can speak to that from experience; and it is pleasing in these times to find evidence of such good feeling between officers and men.

THE DAY CONSUMPTION.

The increase in the Company's business is in a form that is peculiarly gratifying to us; it does not mean a large outlay on our works. We have a steady increase in the day consumption, which, after all, is really the best, in that it saves capital expenditure; and I have every reason to believe, from the position up to the present time, that the current half year will prove as satisfactory to you as the last.

On the proposition of Mr. HARSTON, seconded by Mr. B. W. ELLIS, a vote of thanks was accorded to the Chairman and Directors.

The CHAIRMAN: On behalf of my colleagues and myself, I desire to thank you for the resolution. It is a very great pleasure to us to see the continued prosperity of the Company; and it is a still greater gratification to know that you appreciate what we are trying to do on your behalf.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual General Meeting of this Company was held last Wednesday, at the Offices, Grainger Street West, Newcastle-on-Tyne—Alderman Sir W. H. STEPHENSON in the chair.

The Directors reported that the revenue for the past year was £369,705, and the expenditure £269,985; leaving as profit £99,720. Adding the balance of £13,665 brought forward, there was produced a total of £113,385. After payment of interest and dividends, there would be a remainder of £17,536. The quantity of gas sold during the year was 2,887,804,000 cubic feet—an increase of 74,894,000 cubic feet, or 2·66 per cent., upon the sales in 1904. The increase would have been larger but for the remarkably mild weather in the last two months of the year. The revenue from the sale of gas was £247,668; being only less by £745 than in 1904, notwithstanding that under the revised scale of discounts which came into operation on Jan. 1, 1905, about £7000 extra discount was allowed to large consumers during the year. Residuals realized £96,126, compared with £104,698 in 1904; the amount yielded by coke and breeze being lower by £7945, owing to less satisfactory markets. During the year, 35 miles of mains were laid in extensions and renewals; and there was an addition of 8707 prepayment and 1198 ordinary consumers, which raised the total to 81,534. The number of cooking-stoves fixed upon loan is now 43,256—there having been 8696 prepayment and 614 ordinary stoves added during the year. The number of public lamps fixed was 460; raising the total to 13,109. The Company's new departure of letting out gas-fires on hire has resulted in the issue of 647, of which 188 are upon hire-purchase and 459 upon simple hire terms.

The CHAIRMAN, in moving the adoption of the report, said the Directors had paid all the working expenses, given £7000 in increased discounts to large consumers, and raised the amount carried forward by £3872. The year 1905 had therefore been another satisfactory one—not, however, so satisfactory as 1904, which was really a record year for profits. The quantity of gas sold during 1905 reached 2888 million cubic feet, which beat all previous records. The increase over the previous year's sale was 75 million cubic feet, or 2·66 per cent.; and, but for the abnormally warm and bright weather in November and December, it would have been considerably more. It would be cruel to desire cold and dark days; but there was no question that they increased the sale of gas. As to the residuals, compared with the previous year, the results were less satisfactory by the sum of £8572. This was mainly attributable to the decreased value of coke and breeze. The yield from these two items was £7945 less than in 1904. Here, again, mild weather played a part. The bulk of the coke of the Company was exported. The winter of 1904 and 1905 in Northern Europe—their chief market—was so mild that large stocks of fuel were undisposed of when the winter, such as it was, broke up; consequently the demand and the prices were less. Tar and sulphate of ammonia realized about the same as in the previous year. The demand for automatic installations had evidently not yet been exhausted, as during last year 8707 penny-in-the-slot appliances were placed. This was a larger number than had been fixed in any previous year; the next highest being 8203, in 1902. The total number of automatic installations at the end of 1905 was 35,790. The number of new ordinary consumers during 1905 had been larger than in the immediately preceding years; the number being 1898, which was the highest since 1901, when it was 1243. It was therefore interesting to note that the number of new ordinary consumers had not been materially affected by the introduction of prepayment consumers. There had been an increase of 9310 gas-cookers, of which 614 were of the ordinary class and 8696 automatic. The totals now stood at 7477 ordinary and 35,779 automatic cookers. The number of public lamps had been increased by 659, which raised the total to 13,109, of which 6287 were flat-flame and 6822 incandescent. The new scheme for supplying gas-fires upon hire-purchase and simple-hire terms did not get into full working order until the year was somewhat advanced; but, under the circumstances, it had been very satisfactory, seeing that 188 had already been issued on hire-purchase, and 459 upon simple-hire terms. The amount of capital expended on works during the year was £113,689. The last of the four retort-houses at Redheugh had been fitted up with stoking machinery; so that in these works all the stoking which was done by manual labour seven years ago was now performed by machinery, with the result that the carbonizing wages at Redheugh had been reduced by about 1s. 6d. per ton. In any future extensions or alterations of the other works of the Company, mechanical stoking would, of course, be taken advantage of. The reconstruction of the Elswick retort-houses, to which he referred last year, was still under consideration; and he thought it possible that it might be found that, without serious disadvantage to the Company, it could be postponed for another year. He was pleased to say that the employees of the Company had responded to the appeal of Field-Marshal Earl Roberts, that rifle-clubs should be formed in industrial establishments. A club was in course of formation, which would embrace employees in every department of the Company's works and offices. There would probably be something like 300 or 400 members. The Directors fully approved of the movement, and would grant the club some assistance in the way of providing ranges at the works.

The DEPUTY-CHAIRMAN (Mr. E. A. Headley) seconded the motion; and it was carried.

Dividends at the rates of 4 and 4⅝ per cent. per annum on the preference and ordinary stocks were afterwards declared; and the retiring Directors (Sir W. H. Stephenson, Sir W. R. Plummer, and Mr. U. A. Ritson) were re-elected.

THE SULPHUR RESTRICTIONS.

An Extraordinary Meeting was then held to consider the Gas Companies' (Removal of Sulphur Restrictions) Bill, in the promotion of which the Company are associated with others.

The CHAIRMAN explained that the clauses relating to the sulphur impurities in gas were introduced in 1860, and that out of 720 gas undertakings in the United Kingdom—487 companies and 233 local authorities—authorized by Act of Parliament or Provisional Order between that year and 1904, only 50 were subject to the restrictions thereby imposed, and two of these belonged to Local Authorities—viz., Longton and Widnes. Of the 48 companies, the gas of 20 was not tested at all for sulphur. Therefore, out of the 487 gas companies, 439 were free from, and 48 were nominally subject to, restrictions as to sulphur. But as the gas of 20 of these was not tested, there were only 28 to which the restrictions were not a dead-letter. The Chairman then proceeded to explain the action taken by the associated Companies to have the restrictions removed, and the reasons for it. As far as the Newcastle Company were concerned, he said the Directors anticipated some saving, though not a very large one, in the cost of purification if the Bill passed; but as at present it cost only about ¾d. per 1000 cubic feet, very much saving could not be effected. However, any must benefit the consumers to a far greater extent than the shareholders, for the dividend could only increase as the price of gas was reduced penny by penny; and before a shareholder could take (say) 1s. more dividend, the Company must have first given to the consumer 5s. in decreased gas bills. He concluded by assuring the proprietors that if the restrictions were removed no difference could be detected in the gas, that a great nuisance to those living near gas-works would be removed, and that, without any prejudicial effects, the tendency would be to cheapen gas to the consumers.

Sanction was given to joining the other Companies in the promotion of the Bill.

ADDITIONAL CAPITAL.

Another Special Meeting was then held, at which the shareholders authorized the raising of £60,000 of ordinary stock, and £40,000 of 4 per cent. preference stock.

The New Gas-Works at Withnell.

The Withnell (Lancs,) Urban District Council are proceeding apace with their scheme for supplying the township with gas, to which reference has already been made in the "JOURNAL;" and the buildings, which adjoin the Leeds and Liverpool Canal, are now rapidly approaching completion, while over the greater part of the district the mains have been laid. Up to the present, the township, which has a population of nearly 4000, has had to rely upon oil; and the public lamps have been lighted by this means. As may be remembered, Mr. Isaac Carr, of Widnes, is the Engineer for the scheme. It is probable that when gas is available, the Council will utilize it as power for pumping their water from a watercourse in the Brinscall Valley up to the reservoir on an adjoining hill. At present this work is done by a local firm of cotton manufacturers, who have, we learn, given notice of their intention to relinquish the responsibility. As Withnell forms a portion of the Lancashire watershed area of the Liverpool Corporation, they have very fortunately been able to purchase their water in bulk from that authority at the low rate of 3d. per 1000 gallons.

Injudicious Comparison of Gas and Electricity Withdrawn.

At the Meeting of the St. Pancras Borough Council on Wednesday, the Electricity and Public Lighting Committee reported that they had had under consideration a communication from the Gaslight and Coke Company, requesting the Council to withdraw the following paragraph from their pamphlet entitled, "Electricity—Useful Hints," and stating that unless this was done they would have to consider as to taking further steps in the matter: "One ordinary gas-burner consumes the same amount of vital oxygen as five people. Putting it in another way, an ordinary gas-flame will render poisonous the atmosphere in a room 12 ft. by 14 ft. by 11 ft. in six minutes." The Committee went on to state that, apart from the question as to whether there was any inaccuracy in the statement in question, and further as to whether it was of a litigious nature, they did not consider it worth while to be in conflict with the Gas Company thereon; and they therefore recommended—"That the Gaslight and Coke Company be informed that, while not entering into a discussion of the paragraph complained of, the Council have decided not to distribute further copies of the present issue of the circular." This was agreed to.

SHEFFIELD UNITED GASLIGHT COMPANY.

Presentation to Sir F. T. Mappin.

A very pleasing ceremony followed the meeting of the Directors of the Sheffield United Gas Company on Monday last week, when the services rendered by Sir F. T. Mappin, Bart., during his 43 years' membership of the Board and his 33 years' occupancy in the chair, were recognized by the presentation to him of his portrait in oils. It is the work of Mr. Ernest Moore, and is a replica of the one recently painted for the Town Trustees. Among those present were Mr. Wilson Mappin (the Deputy-Chairman), Messrs. E. Hall, R. A. Hadfield, H. K. Stephenson, T. H. Waterhouse, B. G. Wood, R. Leader (elected Directors), Alderman Batty Langley and Councillor C. F. Bennett (nominee Directors), Mr. Hanbury Thomas (the General Manager), Mr. J. W. Morrison (the Engineer), and Mr. A. T. Watson (the Corporation Auditor).

The presentation was made by Mr. H. K. Stephenson, who spoke of the admirable way in which the Company's affairs had been conducted under Sir Frederick Mappin's chairmanship, and of the affection and regard felt for him by every member of the Board.

Mr. Ebenezer Hall, who for 34 years has been on the Board, testified to the good feeling which had always existed between Sir Frederick and his colleagues, and to the confidence they felt that as long as he was Chairman everything would be conducted satisfactorily. The Company's position of unique prosperity he attributed largely to the able direction of affairs under Sir Frederick's guidance.

Alderman Batty Langley commented on the courtesy which he and his fellow nominee Directors had always received from Sir Frederick Mappin and from the Board generally. Though they were there by authority of an Act of Parliament, they had always been received by the rest of the Board as one of themselves; and the management so commended itself to them that they never found themselves in opposition to the Chairman's policy. Though he (Alderman Langley) was in favour of the principle of municipalizing water, gas, tramways, and other public necessaries, he felt that had the gas supply been in the hands of the Corporation, the consumers could not have been in a better position than they were under the Company. He regarded it as a great advantage to the town that Sir Frederick had been able so long to administer the Company's affairs; and he trusted he might be spared to do so for many years.

Mr. Hanbury Thomas gave some interesting details of the progress of the Company during the period of Sir Frederick Mappin's directorship. In 1862, he said, when Sir Frederick was first elected a Director, the Company's capital was £302,964. Now it was £961,862—an increase of 214 per cent. The quantity of coal carbonized in 1862 was 36,403 tons. Last year it was 279,949 tons—an increase of 669 per cent. The gas sold in 1862 amounted to 304,887,000 cubic feet. In 1905 it was 2,814,989,000 cubic feet, or an augmentation to the extent of 823 per cent. The price of gas was then 3s. 9d. per 1000 cubic feet, compared with the present price of 1s. 5d. to 1s. 1d.—or an average of about 1s. 4d. In looking over the account of the meeting at which Sir Frederick was originally elected, he found that Mr. Edwin Unwin said that "a fitter member of the Board than Mr. Mappin they could not have." Mr. John Hobson strongly advocated his appointment "on account of his excellent and well-known business qualifications and his position as a merchant and a manufacturer;" and Mr. Beckett said "he had no objection to the appointment of Mr. Mappin, who would make one of the best Directors on the Board." The result had shown that the opinions of these gentlemen were fully justified. He considered he was in a better position to testify to the amount of time, energy, and thought that Sir Frederick had devoted to the business of the Company than any other individual. He had been connected with other companies, but had never known a Chairman who had devoted himself to a company's business as Sir Frederick had done. He felt that Sir Frederick was entitled to the gratitude of the gas consumers, as well as of the shareholders; for, in addition to being anxious at all times to supply gas at the lowest possible price, nothing annoyed him more than for the quality to be below the proper standard, or for any impurities to be shown in the chemists' tests. The result of Sir Frederick's long administration of the Company's affairs was that he presided over an undertaking which was as prosperous as any of its kind in the kingdom. As General Manager, he (Mr. Thomas) was in a position to testify to the consideration that Sir Frederick Mappin was always ready to show to the staff, and to the encouragement he gave to those who he felt were doing their duty to the Company.

Sir Frederick Mappin, in reply, remarked that the policy which had been followed by the Company had unquestionably been the right one; and witness to its success could be found not only in their low price and regularly maintained dividend, but in the esteem and appreciation with which the Company's operations were regarded by other gas undertakings and the Technical Press. He had given much time and attention to the affairs of the Company; the work being very interesting to him, as it had doubtless also been to the other Directors. But it must be remembered that gas had had for some time severe competitors in other methods of illumination and power; and business qualities of a high order, combined with a vigorous and energetic development of the progress made in the technical side of the gas industry, were now required of those directing the amount of capital involved in such undertakings. Their success, however, was not entirely owing to their own efforts. Their predecessors set them a fine example; and seeing the results which had been achieved, they had the good sense to follow in their footsteps. They had retained efficient and painstaking officers, and, he hoped, they had always been ready to recognize merit and long service by increasing their salaries. In expressing his sincere and grateful acknowledgments of the very kind feeling towards him, which had prompted them to have so excellent a portrait painted, he must mention as an important factor in his successful chairmanship the loyal support and co-operation which he had at all times received from them all.

The massive gilt frame of the portrait bears the inscription (followed by the names of all the present Directors): "Presented to Sir Frederick Thorpe Mappin, Bart., Feb. 12th, 1906, by the undersigned Directors of the Sheffield United Gas Light Company, as a mark of their personal regard and esteem, and as a token of their appreciation of the great services he has rendered to the Company in the position of Chairman for so long a period. Sir Frederick was elected a Director of the Company in October, 1862, and became Chairman in April, 1873." The portrait—a most admirable likeness—will occupy, with Sir Frederick's consent, a permanent place in the Board-room.

The Half-Yearly Report and Accounts—Reduction in Price.

The Directors of the Sheffield Company will have the gratification, when they meet the proprietors on the occasion of the 102nd ordinary general meeting on the 12th prox., of reporting an increase of 86,982,000 cubic feet, or 6·17 per cent., in the consumption of gas in the half year ending the 31st of December. They remark, in their report, that this indicates that the low prices at which gas is sold is appreciated by the consumers, and that it is being increasingly used, not only for lighting (which is proved by the fact that 4272 additional meters were fixed in the past year), but also for trade purposes and for motive power. They point out that they have availed themselves of every opportunity of reducing the price of gas when circumstances permitted—reductions to the extent of 9d. per 1000 cubic feet having been made since October, 1901. The balance of £83,971 carried forward has been accumulated from time to time by small additions; and as the dividend payable by the Company is limited, this may be looked upon as a safeguard to the consumers that the price of gas will be likely to remain cheap for some time to come, as, before any advance was made, this sum would be drawn upon to make up any deficiencies in the divisible profits. Having regard to these circumstances, the Directors have felt justified in making a further reduction of 1d. per 1000 cubic feet in the price of gas, to take effect from the reading of the indices for the March accounts. The Company's charges will then be 1s. 5d., 1s. 3d., and 1s. 1d. per 1000 cubic feet, according to consumption, and 1s. 1d. per 1000 cubic feet for gas-engines. This reduction amounts to slightly over 7 per cent. on the public lamps, which will be charged at 1s. 1d. per 1000 cubic feet, and also on the gas used for engines, 5½ per cent. to the ordinary consumers, and a proportionately greater percentage to the larger consumers; the total benefit to the Company's customers, calculated on the quantity of gas used in 1905, being £11,779 per annum.

The accounts accompanying the report show that £7308 was expended for capital purposes during the half year; £3738 being for new buildings and plant, and £4365 for new meters and cooking-stoves. The total expenditure up to the end of the year was £961,882; but as only £938,188 had been paid up, there was a debit balance of £23,694. The receipts from the sale of gas were £104,973; from the rental of meters and stoves, £8153; and from the sale of residuals, £60,667—the total revenue being £175,606. The following are the principal headings of expenditure: Manufacture of gas, £92,013; distribution, £13,875; management, £5478. The total expenses amounted to £121,955; so that there was a balance of £53,651 to be carried to the profit and loss account. The balance available for distribution is £127,395; and after providing for the dividend there will be left a surplus of £10,725 on the half-year's working.

BRENTFORD GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at the Charing Cross Hotel—Mr. Howard Charles Ward in the chair.

The Secretary (Mr. William Mann) read the notice calling the meeting; and the report and accounts—which were referred to in the "Journal" for the 6th inst.—were taken as read.

The Chairman said it was his province to move the adoption of the report and accounts. The Directors had again a great deal of pleasure in meeting the proprietors with what he thought would be considered a good and encouraging report. It was true they had got no more than an increase of 3 per cent. in the sales of gas for the half year. But if this was compared with the business that had been done by the Metropolitan Gas Companies, it was very good. The Commercial Company he believed had had a larger increase; but the South Metropolitan Company had only had an increase of 1·5 per cent., and the Gaslight and Coke Company one of 1·2 per cent. Therefore, when a Company had an increase of about 3 per cent., they might consider themselves lucky, having regard to the concurrent circumstances of the half year—the mildness of the weather, the badness of trade, and, especially what began to be recognized now, the effect of the incandescent mantle on gas consumption. There was no doubt that the use of the incandescent mantle was equivalent to a considerable reduction in the price of gas to the consumer. The Directors rejoiced in this, because they believed it was one of the greatest safeguards there could be for the gas industry generally. Although they had not had a very great addition to the amount of their gas sales, they had had a fairly large increase in the number of the consumers; and this would, he thought, show that the business of the Company was on a very substantial footing. They had an increase in the number of consumers in the district from 56,200 at Christmas, 1904, to 59,669 at Christmas last. Turning to the accounts, there was not much to be said. In the capital account, it would be seen that the amount expended during the half year was £18,223; but, by the Company's system of writing off depreciation of stoves, prepayment meters, fittings, and fixed plant (which was allowed specially by the Official Auditor), they had written off no less than £13,178; so that the increase of capital during the half year had only been £5045, which was very small, considering the business done. Going to the revenue account, he did not know that there was very much to be said about the figures. It would be noticed that, in the manufacture of gas, there had been charged for repairs and maintenance of works and plant and so on, less the amount for old materials sold, £13,877, against £12,738 in the

corresponding period of 1904. But it must be remembered that, in this item of repairs and maintenance, they charged wear and tear; and he thought the Directors would have the approval of the proprietors for having done so. A considerable amount had been charged on account of the new offices that they had put up for the convenience of the Company's business, and which offices had certainly proved to be a great convenience to the consumers, and to the Company and their officers. The Directors had charged against the revenue of the half year—not all of this outlay, but about £3000; and for this reason, although the offices gave them greater facilities, they did not produce anything in the way of increased revenue or business. Therefore, if they were to charge this expense to capital, they would be loading the capital with that which was not really a profit-bearing outlay. He thought it would be seen that the business of the Company was flourishing exceedingly. The rental of ordinary meters had increased; the rental of prepayment meters and fittings had increased very considerably; and the rental of gas-stoves had similiarly increased. A bad feature, which was common to every gas company almost in the kingdom was the slump in the price of residuals. Coke had been an awful drug. It would be seen that for coke they had only received £18,504, against £21,049 in the corresponding period of 1904. For tar and ammoniacal liquor, they had received a little more; but, taking the residuals together, they brought them in only £28,513, against £30,121. Regarding the other accounts, they had an insurance fund now of £6240; and a very desirable fund it was. The reserve fund was £27,144. The Directors had determined to put into it again the ½ per cent. they were entitled to do for the whole year. This would amount to £3400. To put the matter into a nutshell: The results of the half-year's working was that, with the sums they had carried to depreciation for the various matters he had brought before the proprietors, they had a profit of £38,158. What they wanted for the half-year's dividend was £39,250; so that there was an apparent deficit of £1091. But if they looked at the sums written off for depreciation of meters, stoves, and so on, on capital account, and also at what he had said as to the offices, it would be seen that there was really a considerable surplus after paying the dividend. Bringing forward the balance from the previous half year, they would, after paying the dividend, carry forward a balance of undivided profit amounting to £57,912. This was a condition of affairs that was very satisfactory to the Directors, and was, he hoped, the same to the proprietors. Perhaps he ought to mention that out of the £57,912, they would have to put by the £3400 for the reserve fund. It was a great thing to have this money at hand invested in Consols.

Mr. Ulick J. Burke seconded the motion, which was unanimously carried.

On the proposition of the Chairman, seconded by Mr. Burke, a dividend at the rate of 5 per cent. per annum on the 5 per cent. preference stock, at the rate of 12½ per cent. per annum on the consolidated stock, and at the rate of 9½ per cent. per annum on the new stock 1881, was declared.

Moved by the Chairman, and seconded by Mr. Burke, the retiring Directors (Mr. R. Shafto Adair and Mr. Frank Morris) were re-elected; and, on the proposition of Mr. J. Coppen, seconded by Mr. J. Reeson, the Auditors (Messrs. Monier F. Monier-Williams and Alfred Bevis) were re-appointed.

Mr. H. D. Ellis, in moving a vote of thanks to the Chairman and Directors, said the accounts were most gratifying. He would venture to applaud every point of the policy of the Board which the Chairman had put before them; and he did so with great respect as an officer of a Gas Company. So far as he was concerned, the policy of keeping down the capital and charging upon revenue when they could properly do so, was most satisfactory and sound. The Chairman had referred to the poverty of the increase of 3 per cent. in the consumption of gas; but this 3 per cent. had been exceeded, so far as he knew, by very few undertakings. It was the equivalent of 1d. per 1000 cubic feet on the price of gas.

The Chairman: We have been accustomed to increases of 7, 8, and 9 per cent.

Mr. J. Reeson, in seconding the motion, said he could cordially agree with every word Mr. Ellis had said with regard to the policy of the Directors. It was emphatically the right one for a Gas Company, especially in these times of competition.

The motion was unanimously carried.

The Chairman, in his acknowledgment, said he was sure it was the earnest effort of the Board and every officer to do all they could to promote the prosperity of the Company; and it was not very wonderful, because they were considerable shareholders in the Company themselves. To promote the prosperity of the Company was to do something towards putting a little into their own pockets, as well as doing good to the consumers. It was usual to couple the officers of the Company with this vote. He was sorry to say one of the officers—their Engineer, Mr. James Husband—who they were accustomed to see at the meetings, was away through temporary indisposition. He need not say how well they were served by their Engineer and their excellent Secretary and everyone connected with the Company—the officers and workmen alike.

A Street-Box Explosion at Pontypool.—An explosion of gas occurred in Pontypool last Thursday, resulting in injuries to three people, in addition to blowing up several yards of flagging. It happened while a fitter was trying to find a fault in the electric light cable.

Liverpool Water for Runcorn.—On Monday last week, Alderman Burgess, the Chairman of the Water Committee of the Liverpool Corporation, performed the ceremony of turning the Vyrnwy water into the Runcorn reservoir. The Urban District Council have connected their service with the Vyrnwy main at Moreton Tower, at a cost of about £6000, in order to supply Runcorn, Halton, and Weston. The Runcorn supply is drawn from the red sandstone rock at a great depth, and is very hard. The Welsh water has been obtained in the interest of the manufacturers of the locality. The Council have arranged to have not less than 300,000 gallons and not more than 1,000,000 gallons per day, at a cost of 6d. per 1000 gallons.

CROYDON GAS COMPANY.

Half-Yearly Report and Accounts.

At the Meeting of the above-named Company on Friday next, the Directors will report an increase of 3·59 per cent. in the total sales of gas in the past half year, as compared with the six months ending Dec. 31, 1904; the increase in the Caterham district being 6·91 per cent. The number of consumers has risen by 1111; and the number of stoves on hire by 597. The accounts accompanying the report show that the revenue from the sale of gas was £73,226; from the rental of meters, stoves, and house fittings, £7047; and from the sale of residual products, £18,463—the total receipts being £98,818. The expenditure having been £75,181, there was a balance of £23,637 to go to the net revenue account. The amount available for distribution is £23,210; and the Directors recommend the declaration of dividends at the rates of 14½, 11½, 10¾, 10, and 5 per cent. per annum respectively (all less income-tax), on the various stocks. The payment of these will absorb £19,674, and leave a balance of £3536 to be carried forward.

The working statements show that 36,093 tons of coal and 547,699 gallons of oil were employed last half year in the manufacture of 578,444,000 cubic feet of gas, of which 533,135,100 cubic feet were accounted for. The estimated quantities of residual products were: Coke, 21,656 tons; breeze, 5310 tons; tar, 468,611 gallons; ammoniacal liquor, 1,032,041 gallons—the quantity of sulphate of ammonia made being 375 tons.

SOUTH SUBURBAN GAS COMPANY.

Half-Yearly Report and Accounts.

The report which the Directors of the Company will present at the half-yearly meeting on Friday opens with the statement that the period covered by it was uneventful.

The action of the Local Authorities necessitated an increase in the price of gas from 2s. 5d. to 2s. 6d. per 1000 feet at Midsummer last, due to the resumption of totally useless enrichment; and at this price the profit earned is sufficient to pay the same dividend as before, and leave £130 to be added to the balance to be carried forward, making it £3652. The increase in the gas consumed over the latter half of 1904 was 1·4 per cent. It is explained that the small rates of increase recently occurring are the direct result of the policy of the Company—viz., recommending to the consumers economy of gas by the use of the incandescent mantle.

Regret is expressed at the necessity for another application to Parliament—the fourth year in succession. The expenses of these applications already exceed £8000, which to the extent of at least seven-eighths has fallen on the consumers. It is hoped that the Local Authorities will at last be reasonable, and thus avoid further unnecessary outlay. In the Bill of 1903, four claims were made: (1) Relief from the use of lime for purifying, which was productive of a nuisance; (2) a reduction of the nominal illuminating power by 2 candles; (3) authority to offer new issues of stock to the consumers and employees direct at the market price; and (4) authority to permit employee shareholders to elect employee directors. That Bill passed the Committee of the House of Commons intact, in the face of strenuous opposition. The opposition was renewed in the House of Lords—the Committee being urged to reject the Bill because the Board of Trade were going to appoint a Departmental Committee of inquiry relating to the three large Metropolitan Companies; and the Bill was lost. In 1904, the same Bill was introduced. The Board of Trade Committee had been appointed but had not reported. The Board of Trade, moved by the Local Authorities, said, as their Departmental Committee were considering the first and second points, these must be withdrawn; and the Bill containing only the third and fourth points was passed, though strong opposition had been offered to point the third in 1903.

In 1905, a Bill containing the first and second points was introduced; the Departmental Committee having reported favourably on the former, while being neutral on the latter. But it was again opposed by the same Local Authorities—the London County Council always leading—though only about one-sixth part of the Company's district is within the County of London. The borough of Lewisham, in which that part is almost entirely situated, also opposed on their own account. The Committee passed both points; but the London County Council pressed for a method of testing so manifestly impracticable and unfair that the Directors withdrew point the second, and the Bill was passed with the first and two minor provisions—one protecting the Company's property when let out on hire, and another clearing up the question of mutual responsibility for meter errors. Thus three out of the four claims in the original Bill have been gained after very expensive contests in three succeeding sessions at great cost to the Company's consumers; while the heavy costs of the Local Authorities fall on the ratepayers, most of whom are also consumers. The present Bill is to obtain the second point—viz., a reduction of 2 candles in the illuminating power and the testing clause of the London County Council Bill of last session, and with a reduction of the initial price which last year even the opponents considered to be fair.

The accounts accompanying the report show that in the six months ending Dec. 31 last there was spent on capital account a sum of £6775, of which £3047 was for new buildings and plant, £2183 for new mains and service-pipes, £1090 for meters, and £505 for stoves. The total capital expenditure to the end of the past year was £799,544; but as only £788,415 had been received, there was a debit balance of £11,129. The revenue from the sale of gas was £83,190; from the rental of meters and stoves, £5769; residuals produced £24,749; and the total receipts were £113,778. The expenditure on the manufacture of gas was £70,077; on distribution, £10,885; on management, £4929; and the total expenses were £93,061—leaving £20,717 to be carried to the net revenue account. The balance available for distribution is £20,964; and the Directors recommend a dividend at the rate of 5½ per cent.

per annum, to which they are entitled under the sliding-scale. The working statements show that 65,656 tons of coal were carbonized in the half year; and that the make of gas was 735,231,000 cubic feet, of which 667,492,000 cubic feet were sold and 675,669,000 cubic feet accounted for. The residuals produced were: Coke, 787,872 cwt.; breeze, 15,202 yards; tar, 690,018 gallons; ammonical liquor, 13,801 butts —the quantity of sulphate of ammonia made being 510 tons.

WANDSWORTH AND PUTNEY GAS COMPANY.

Reduction in Price.

The Half-Yearly Meeting of this Company was held at the Offices, North Street, Wandsworth, on Tuesday last—Mr. H. E. JONES (the Chairman) presiding.

The SECRETARY (Mr. C. W. Braine) read the notice convening the meeting, and the report and accounts were taken as read. The revenue account showed a profit of £13,075; and after providing for interest on the debenture stock and on deposits and loans, there remained, with the addition of the balance brought forward, an amount of £18,508 available for the payment of dividend.

The CHAIRMAN said that, before proceeding with the ordinary business, he wished to point out to the shareholders present the loss that the Company had sustained through the lamented death of their late Director and Chairman, Mr. Thomas S. Howell. He had been connected with the Company for a period of 52 years, and occupied the chair for 44 years. Mr. Howell had always taken very great interest in the well-being of the Company; his father, indeed, was the founder of it. In fact, the Howell family had had a great deal to do with the Company in the past. It would only be right and proper for the meeting to pass a vote of condolence with the members of the family. Before going to the accounts, he thought he should also mention the loss the gas world had sustained through the death of Colonel Sir W. T. Makins, the respected Governor of the Gaslight and Coke Company, whose funeral he attended last week. It was only becoming to express at that meeting sympathy with the relatives of the deceased. Proceeding to the accounts, it would be seen that the Company had been able to reduce the price of gas from 2s. 2d. to 2s. per 1000 cubic feet from Christmas last; and he would like to mention that only one other Company in London had hitherto reached such a low price. The manufacture of gas had cost only some £650 more than last year; their increase in sales had been over 5 per cent., as compared with the corresponding period of the previous year; and the total income from rental had been £50,226, as against £47,732—or £2500 better. The charges for distribution were about £300 more; and the other charges were practically the same as in former years. The profit for the corresponding period had been £11,900; whereas it was now £13,075. This gave a small surplus after allowing for dividend; and, reckoning on this and the possible slight saving which would arise from the abolition of lime purification—which was troublesome, hazardous, and irksome, as well as causing very anxious times to the officers—added to the surplus in hand, the Directors had seen their way to reduce the price of gas as already mentioned. The capital account showed that only £4000 had been expended, chiefly on mains and services, meters and stoves, and automatic fittings, the latter of which were thought very much of by the poorer classes, and were taken up with avidity. These points exhausted what he had in his mind to say to them respecting the accounts, except that a resolution would be put to the meeting to increase the salary of the Secretary. Going back to the question of lime purification, they had now a Bill in Parliament which proposed to repeal certain sections of their Act of 1900 with reference to sulphur. When the Company obtained their Act, they had to accept the usual purity clause which had been in use for about thirty years; but a very scientific Committee which had been appointed by the Board of Trade had reported that there was little or no harm in the sulphur detected. He concluded by moving the adoption of the report and accounts.

Mr. WALTER HUNTER, who seconded, said he was pleased to see that the concern was in such a flourishing condition. He thought that in reducing the price of gas, the Directors had done the right thing.

The motion was unanimously adopted.

The rates of dividend were then declared as follows: "A" consolidated stock, £7 15s. per cent. per annum; "B" consolidated stock, £6 5s. per cent. per annum; "C" ordinary stock, £5 8s. 6d. per cent. per annum.

The retiring Directors and Auditor were unanimously re-elected.

The meeting was then made special, for other business.

The CHAIRMAN said they had to ask permission and sanction to the Bill which they proposed to bring before Parliament to repeal certain restrictions as to sulphur. As they very well knew, the process of lime purification was a very costly and uncertain method; and about a year or so ago, the three large London Companies introduced a Bill to do away with it. On the report of the Board of Trade Committee which he had already referred to, this method of purification was to be abolished; and it was to obtain the same relief for their Company that the proposed Bill was being promoted.

It was unanimously agreed to proceed with the Bill for the removal of the sulphur clauses.

The usual votes of thanks terminated the proceedings.

The Cost of the Lincoln Typhoid Fever Epidemic.—At the meeting of the Lincoln Board of Guardians last Tuesday, the City Accountant (Mr. J. H. Burgess) sent in a statement regarding the typhoid fever accounts, which showed that the cost of the epidemic had been ascertained, and that he was in a position to supply the information asked for by the Board in reference to the City Council's claim for the cost of treatment of cases for which the Board were liable. The figures were: Total cost of the epidemic, £12,407; number of patients treated in hospitals, 424; aggregate period under treatment, 19,682 days; average cost per head per day, 12s. 7·29d.; average cost per head per week, £4 8s. 3d. The statement was referred to a Committee.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

A Satisfactory Year at Chester.

The Directors of the Chester United Gas Company reported, at the half-yearly meeting on Monday last week, that the deliveries of gas in the six months ending the 31st of December had been satisfactory; the increased sales being more than sufficient to meet the reduction in price made at the beginning of 1905. Improvements had been effected in the purifying plant; and the works and mains (under the supervision of Mr. John C. Belton, the Engineer and Works Manager) had been kept in a thoroughly efficient condition. The accounts showed a balance of net profit of £4021, compared with £3985 this time last year; and the Directors recommended a dividend at the rate of 2½ per cent. for the half year. The Chairman (Mr. John Gamon), in moving the adoption of the report, said the Directors were glad to welcome three workmen shareholders, who attended the meeting as proprietors of gas stock. Proceeding to deal with the revenue account, he said there had been a reduction of 5d. per ton on the coal contract from the 1st of July, which had effected a saving of £400. The residuals, particularly coke and tar, had not done so well; and there was a deficit of £1250 for the half year. The income from the sale of gas had, as mentioned in the report, more than balanced the reduction of 2d. per 1000 cubic feet in the price. After the payment of all dividends they carried forward a little larger balance than in 1904, and they had paid off £1445 for renewals of plant. The reserve fund was now only £488 short of the full sum that they were authorized to place to it. The fund amounted to £11,900 in Consols, which was more than sufficient to pay a full year's income on all the stock. The increase in the quantity of gas sold was 7 million cubic feet. They had 125 additional ordinary consumers, and they had put in 400 odd automatic meters. In 1896, the total number of consumers in the city amounted to 3940, against 7318 now—an increase of nearly 90 per cent. in ten years. Having regard to the reduction in the price and the abolition of meter-rents, gas was sold in 1905 at the lowest price ever charged in Chester; and they had sent out the greatest quantity of gas and done the largest business in the supply of cookers and fires. The report was adopted.

Extended Field of Operations at Derby.

In the last number of the "JOURNAL," we indicated the principal features in the report of the Directors of the Derby Gas Company for the twelve months ending the 31st of December last; and we now emphasize some of them by the aid of the remarks of the Chairman (Mr. G. Gascoyne, J.P.) at the annual general meeting on Friday in moving its adoption. Beginning with the capital account, Mr. Gascoyne pointed out that the expenditure had been somewhat heavy, but of a remunerative nature; the amount expended upon new mains and service-pipes (£3836) including the extension of mains to Allenton and Chellaston. New meters had cost £2449, and new gas-stoves the large sum of £6905; making a total capital expenditure of £14,204. This, however, was subject to the usual percentage allowed for depreciation on stoves and meters, and left a net sum of £11,940 chargeable to capital account; the total of which at present amounted to £409,716. Turning to the revenue account, the Chairman said the consumption of gas during the year had increased. The total received for gas was £72,859, compared with £71,907 in 1904—being £951 more. This was a very satisfactory indication that gas was more popular than ever, for lighting, for heating, and for motive power. The one great step in advance which had produced so marked an improvement in the illuminating power of gas had been the introduction of the incandescent mantle, the use of which gave an immensely superior light at considerably less cost to the user. The number of consumers had gone up during the year from 23,764 to 24,439, which was an addition of 675. Gas cooking-stoves and gas-fires in use had increased from 6949 to 9307—an addition of 2356 in one year. The increase was mostly in stoves. With the view of encouraging the use of gas for heating purposes, the Directors recently decided to discontinue the charge for fixing gas fires and stoves. Referring to the use of gas for motive power, the Chairman said the demand continued to increase. Turning to the expenditure, the first, and by far the largest, item was coal, which cost £27,524. In this, there was a saving of £1550, due to lower prices and better carbonizing; and he might mention that the Directors had contracted for the bulk of the coal required for the next eighteen months. In purification, there was a saving of £259; and the item of wages for carbonizing was less by £387, notwithstanding that more gas than ever had been manufactured. This diminution was due to the introduction of stoking machinery in their Cavendish Street works, of which the results were very satisfactory. Having dealt with other items in the accounts, the Chairman concluded by saying that he thought the Company's prospects for the current year were favourable and hopeful. The report was adopted, and the dividend recommended was declared. The next business was of a personal character; comprising an increase of £50 per annum in the salary of the Secretary (Mr. H. Bullivant), and a vote of 500 guineas to the Directors in recognition of the services they had rendered in connection with the acquisition of the undertakings of the Spondon and Etwall Gas Companies. The meeting was then made special to consider the terms for the purchase of these properties, which the Chairman said had been strongly recommended by their excellent Engineer (Mr. J. Ferguson Bell, Assoc.M.Inst.C.E.). After he had made some remarks setting forth the advantages of the purchase, and explaining the general features of the Bill the Company have promoted to sanction it, as well as (*inter alia*) to remove the sulphur restrictions, he concluded by stating that the Corporation at first took exception to the Bill, but that, as the result of a very friendly meeting between representatives of the Board and the Parliamentary Committee of the Corporation, they were able to acquiesce in their desire for certain concessions; and they did not, so far as they could see, anticipate any opposition. He formally moved that the shareholders approve of the course taken by the Directors; and the motion was carried.

Improved Lighting and Reduced Price at Scarborough.

The Chairman of the Scarborough Gas Company (Mr. B. Fowler, J.P.) was in a position, at the annual meeting on the 10th inst., to

congratulate the shareholders on another year's successful working. The total income from all sources was £52,512, compared with £54,557 for the year 1904—a decrease of £2045. This, he explained, was largely accounted for by the reduction made in the price of gas, at the beginning of last year, of 2d. per 1000 cubic feet to ordinary consumers at Scarborough, and 6d. per 1000 cubic feet to the consumers at Scalby; and by a smaller revenue by £635 from residuals. The quantity of gas sold was about 2 million cubic feet in excess of 1904. The expenditure for the past year was £34,153, compared with £35,193 for 1904—a decrease of £1040. The cost of lighting, repairing, &c., the public lamps was less last year than in 1904. The expenses for that year were abnormally high, owing to a large number of the old lamps having been replaced by those of a modern and up-to-date type, the effect of which was seen in the greatly improved lighting of the town; and he was sure the streets which were already lit by the incandescent lamps would compare favourably with any street lighting in the country. As, however, a good many streets were still lit with the old flat-flame burners, the Directors had made a substantial reduction to the Corporation in the maintenance charge for incandescent lamps, with a view to their further extension, and in order that such extension might be done at as small a cost as possible to that body for street lighting. The balance on the net revenue was £10,824, out of which dividends amounting to £6588 were payable—leaving a surplus of £4236. Looking at the position of the Company, the Directors now felt justified in making a further reduction of 1d. per 1000 cubic feet to the ordinary consumers in Scarborough, and 3d. per 1000 cubic feet to those at Scalby—to take effect from the end of the present quarter. The Directors' report was adopted, and a dividend of 5 per cent. was declared. Votes of thanks were accorded to the Directors and officials; the Engineer and Secretary (Mr. A. Allan) responding for the latter.

Improved Lighting and Good Business at Wakefield.

The report and statement of accounts for the half year ending the 31st of December, which were presented to the shareholders of the Wakefield Gas Company on Monday last week, were considered very satisfactory, the dividend having been earned in spite of the competition of electric lighting and depressed trade, and notwithstanding the unusually mild and fogless winter. The profit made was £6454, to which should be added £3174, the balance on the profit and loss account; making a total of £9628 available for distribution. During the half year, nearly 400 outside lamps were fixed for lighting shop windows, to the great satisfaction of tradesmen—in some cases displacing the electric light, and incidentally greatly improving the appearance of the city after dark. The reserve fund now amounts to £8397, and the insurance fund to £5300, both of which funds are invested in good securities. On the motion of the Chairman (Dr. Statter), seconded by the Vice-Chairman (Mr. G. A. Moorhouse), the report and accounts were approved and adopted. The recommendation of the Directors to declare dividends at the rates of 11½, 9, and 8½ per cent. per annum (less income-tax) was also adopted. On the motion of Mr. Hall, seconded by Mr. Tranmer, and supported by several shareholders, it was unanimously resolved to grant the Chairman the sum of £50 per annum as additional remuneration, in recognition of the greater amount of work and responsibility devolving upon him. In acknowledging the vote, the Chairman accepted the increase in the spirit of goodwill and good fellowship which had evidently prompted it. A vote of thanks was passed to Dr. Statter for presiding, and to the Directors for their attention to the business of the Company. In responding to the vote, the Chairman moved and the Vice-Chairman seconded, a hearty vote of thanks to the Engineer (Mr. H. Townsend, M.Inst.C.E.), the Secretary (Mr. W. H. Parker), and the respective staffs, which was suitably acknowledged.

Preparing for More Business at Walker.

The accounts for the twelvemonth ending Dec. 31 which were presented at the annual meeting of the Walker and Wallsend Union Gas Company last Friday showed a profit of £8953, which added to the balance brought forward made a total of £12,758. After the payment of interest on mortgagees, &c., and placing £500 to the credit of the depreciation fund, there would be left sufficient to pay dividends at the rates of £5, £6 7s. 6d., and £4 17s. 6d. per cent. per annum on the preference and two ordinary stocks, and leave £4001 to go to the next account. In their report, the Directors said the revenue results for the year had been very satisfactory. There was an increase of £2221 in the receipts, and of £1144 in the expenditure, as compared with 1904. The demand for gas had continued, and there was an augmentation to the extent of 17·11 per cent. in the number of consumers. During the year, there had been an addition of £24,112 to the capital account, for the necessary extensions to the new and existing works and plant. The Royal Assent to the Company's new Act was given on the 30th of June last; and, in pursuance of the powers thereby conferred, the purchase of the land for the new works at Willington Quay had been completed; and the developments upon the new site were having the Directors' careful attention. Contracts had been entered into for a new tank and a three-lift gasholder of a million cubic feet capacity, to be ready for use next winter. The Chairman (Alderman Crawford), in moving the adoption of the report, said the past year had been a very satisfactory one; the gas sales being the largest aggregate hitherto obtained. The increase in the number of new consumers had continued very steadily during the year. Great strides were being made in the various uses to which gas was applicable; and the Directors, with the object of keeping up to date, were adopting the latest methods of appealing to the public. The gas-fitting and stove department having proved very successful, a new scheme upon a three-years hire-purchase system for gas-fires and heating apparatus has been favourably considered, and was now about to be put into operation. The increase in the gross profits over the previous year was £1076. The expenditure also compared most favourably. There remained a very satisfactory gross profit of £8953. The report was adopted, and the dividends above mentioned were declared. A special meeting was held to consider the Gas Companies (Removal of Sulphur Restrictions) Bill; and the purpose of the measure having been explained by the Chairman, authority was given to promote it.

Water.

Progress of the Colne Valley Water Company.

Presiding at the half-yearly meeting of the Colne Valley Water Company (held at the Charing Cross Hotel last Tuesday), Mr. C. E. Keyser said the total amount of the water-rents for the six months to Dec. 31 was £18,295; while that for the corresponding half of 1904 was £17,062. There was thus an increase of £1233; and adding this to the gain of £1313 in the first half of the year, there was a total increase in 1905 of £2546. This increase had only been exceeded in two previous half years. Some people thought their district was getting pretty well developed; and he thought therefore it was very satisfactory to find they were still getting these large increases in rates. The number of new supplies during the six months was 398, estimated to yield £1231 a year, making a total for 1905 of 734, with a calculated rental of £2113. The total number of supplies now was just over 14,000, and the population supplied more than 77,000. The erection of new houses had continued to be very satisfactory; the amount received for building supplies during the past half year having been £646, which was more than in any previous six months. The percentage of empty houses was less during 1905 than for some years past. It had been 5½ per cent. lately; but last year it fell to 4·8 per cent. As to expenditure, the increase in the cost of maintenance and management was only £467; and of this £308 was due to the growth of local taxation, which amounted to £4000 a year, or 2s. 2d. for every pound received in water-rentals—that was to say, a little over 10 per cent. of the gross receipts. He believed they were not the only Company who complained at the present time of the high rates. With regard to profit and dividend, the result of the half-year's working showed a net balance of £11,613, out of which a further £1000 had been placed to contingency fund account, and the same dividends were proposed as last time. The contingency fund amounted to over £7000; and the balance of undivided profit would be £1419 after deduction of the dividends. The total quantity of water pumped last half year was 446 million gallons, or 25 gallons per head per day for domestic purposes, which was slightly higher than usual. Last autumn some additional shares were issued, and the price realized was £22 9s. 9d. per £10 share. Ten years ago, when shares were issued by tender, the average price was £13 17s. 4d. As to the quality of the water, Dr. Thresh in his reports stated that it maintained its customary high degree of purity. Dr. Thresh had also reported favourably in regard to the quality of the water from the boring recently made on the Company's land at Eastbury Road. This land had been purchased in view of meeting future contingencies. The Consulting Engineers (Messrs. John Taylor, Sons, and Santo Crimp) stated that the whole of the Company's works were in an excellent state of efficiency. The report was adopted; and dividends were declared at the rate of 8½ and 7 per cent. on the two classes of shares. The Chairman pointed out that another ½ per cent. could have been paid; but they always made it a rule only to increase the dividend in the half year ending June. Other business transacted included the raising of the Directors' fees from £1000 to £1500 a year.

Five Years' Progress at Farnborough.

The accounts presented at the half-yearly general meeting of the Frimley and Farnborough District Water Company on the 10th inst. showed a revenue balance of £3650; and, after paying the interest due on the debentures, &c., there was available, with £2382 brought forward, a sum of £5691 for distribution. The Directors recommend a dividend for the six months ending Dec. 31 last at the rate of 6½ per cent. per annum, carrying forward £3015. In the course of his remarks in moving the adoption of the report and accounts, the Chairman (Mr. A. C. Pain) sketched the progress of the undertaking during the past five years. He said that if the proprietors compared the figures for 1900 with those of 1905, they would find that there had been a satisfactory growth in the business on every hand. This being the case, the Directors thought they could not have acted in any other way than they had done in extending the mains, &c. At the end of 1900, they carried forward a reserve of £570; whereas in 1905 it was £3015. This, he thought, was a safeguard for the future. During the last five years, they had an average capital expenditure of £12,110 a year, which amount was laid out on mains, reservoirs, and so forth. The Directors would not have been justified in making so large an expenditure had not the Company been a progressive and flourishing concern. The gross receipts at the close of 1900 were £5490; and for the past year, £12,918—a very substantial increase. Five years ago the expenses were £3048; and now they were £6037—a rise of £2989, against a growth of revenue of £7428. This showed that, while the latter had been augmenting, the former had been diminishing. This was in a large measure due to the efforts of the Manager (Mr. F. W. Talbot). With regard to the net profits, five years ago they were £2542; while last year they totalled £6880. Therefore he considered he had every reason for saying that the concern was a successful one, and had a good future before it. The report was adopted.

Wanted, a Shareholder.

The Directors of the Leatherhead and District Water Company had a unique experience on Monday of last week, when they assembled for the purpose of holding the "ordinary half-yearly general meeting of shareholders;" for not a solitary proprietor, other than those connected with the management of the Company, put in an appearance. Whatever was the cause—whether it was the satisfactory state of the undertaking, the cold weather, the altitude of the room in the Cannon Street Hotel which was the scene of operations, reliance on the Press to faithfully report the proceedings, or illness or pressing engagements on the part of the entire body of shareholders—the fact remained that the Board found themselves without an audience to whom to render an account of their stewardship. Under these somewhat trying circumstances, the Chairman (Colonel Gleig) dispensed not only with the reading of the report and accounts—as is, of course, customary—but also with the delivery of his address; contenting himself with formally moving the adoption of the former. This was carried unanimously—the Board themselves constituting a quorum of shareholders. Then the retiring Directors and Auditor were re-elected. The report stated that the receipts for the half year to Dec. 31 amounted to £4120, and

the working expenses to £2242, leaving a profit of £1878. To this had to be added £1800 brought forward from the previous half year, making a total of £3678. Deducting from this sum £187 interest on debenture stock, there remained £3491 available for division. Out of this the Directors recommended a dividend at the rate of 8 per cent. per annum on the original shares, and the maximum dividend at the rate of 7 per cent. per annum on the remainder of the shares. This would absorb £1598, and leave a balance of £1892 to be carried forward. During the half year 70 new services were laid on. The Engineer (Mr. F. Southwell Cripps) reported that the supply had been satisfactory in both quantity and quality; while the plant generally was maintained in good order, and the sum allowed for depreciation adequate. A new Worthington engine had been erected; and about 1500 yards of small mains were laid. Larger mains will shortly be put down to augment the supply to Bookham and other parts of the district.

COST OF PUBLIC LIGHTING IN THE METROPOLIS.

A return has just been issued showing, according to the accounts for the twelve months preceding March 31, 1905, furnished to the Local Government Board under the London (Equalization of Rates) Act, 1894, the amounts paid during the year out of the equalization fund to the Corporation of London and to each of the Metropolitan Borough Councils, and the outlay incurred by each of these authorities. The following figures show the expenditure in respect of lighting :—

Corporation of the City of London	£24,949	Islington	£35,180
Borough Councils—		Lambeth	13,546
Battersea	13,314	Lewisham	7,778
Bermondsey	9,983	Poplar	11,841
Bethnal Green	4,428	St. Pancras	21,365
Camberwell	11,699	Shoreditch	16,260
Deptford	3,993	Southwark	11,962
Finsbury	6,658	Stepney	18,464
Fulham	12,166	Stoke Newington	3,529
Greenwich	4,666	Wandsworth	17,372
Hackney	16,896	Woolwich	8,030
Hammersmith	8,541	Total	£282,620

INCREASED GAS SUPPLY AT MACCLESFIELD.

Additional Storage v. Water-Gas Plant.

Mr. W. Newbigging, the Gas Engineer to the Macclesfield Corporation, has lately presented to the Gas Committee a report on the subject of the increased daily output of gas and the best means of meeting it. In the 24 hours ending on Saturday morning, the 30th of December last, the output was 1,050,000 cubic feet, which was 10·29 per cent. higher than the record output during the winter of 1904-5, which reached 952,000 cubic feet. Mr. Newbigging pointed out that, owing to this very considerable increase in the maximum day's output, it was necessary at once to give attention to the means whereby it could be met. There were two courses open to the Committee—first, the installation of a carburetted water-gas plant, as recommended by the late Engineer in 1900; and, secondly, the providing of increased storage or gasholder capacity. He said he did not recommend the former; and in order to clear the way for the discussion of the alternative course, he briefly stated his reasons as follows :

In the early part of 1900, and previous to that date, the cost of water gas was less than coal gas. About April, 1900, the price of oil nearly doubled, and though it has come down again since then, another objection has arisen, stronger even than a high price, and that is the quality of the oil has gone down, and the results obtainable then are not possible at the present time. The procuring of an oil suitable for carburetting purposes is almost impossible. The great and increasing demand for petrol for motor cars has resulted in the extraction of the lighter distillates from the oil, leaving behind an oil which does not yield the results obtained in 1900. The difference in cost of producing water gas and coal gas has always been slight; but this sweating of the oil is increasing the cost of water-gas manufacture, and the probability is that the cost will be permanently maintained.

Mr. Newbigging said he had not overlooked the advantages of a water-gas plant, and had given them due weight; but he recommended that, at present, the Committee should dismiss from their minds the thought of adopting water gas. However advisable it was in 1900, the conditions had materially altered since then. The alternative course was, therefore, the one he recommended them to take. Mr. Newbigging then went on to state that the present storage (leaving out of the calculation a holder which will shortly be dispensed with) is equal to 900,000 cubic feet working capacity; but in view of the fact that the maximum day's output has reached 1,050,000 cubic feet, this is below the recognized minimum. Keeping more retorts under fire, and a larger number of stokers, during the six or eight weeks of heavy consumption, would not meet the difficulty. The position was that the manufacturing and purifying plant were capable of meeting a considerably greater output if the storage capacity was increased. It would be possible, by adding another lift to the No. 1 holder, to supplement it to the extent of 225,000 cubic feet; but he did not recommend this as the wisest course to take, for reasons which he fully stated. If a new lift were added, it would be necessary to remove the two existing lifts, and provide three entirely new lifts with extended guide-framing, the cost of which would be £4700. The alternative course, and the one he strongly recommended the Committee to take, was to provide an additional tank and holder capable of containing 600,000 cubic feet; thereby bringing the storage capacity up to 1,500,000 cubic feet. The Corporation's Act of 1882 was not very clear on the point as to whether the proposed holder could be erected on the land adjoining the present site; but assuming that it could be put up on the site adjoining the present holders without further powers, he estimated the cost at £8000.

Mr. Newbigging concluded by saying he was aware of the existence of a feeling that the coming electricity works would reduce the output of gas, and that the Corporation should not enlarge the gas-works at this juncture. He was not of this opinion.

BERLIN MUNICIPAL GAS UNDERTAKING.

The annual report of the municipal gas undertaking at Berlin for the year ending with March, 1905, has recently been published. The number of consumers supplied through ordinary meters has risen by 12,258, of consumers supplied through slot-meters by 5207, and the quantity of gas sold by 280 million cubic feet. The total consumption of the slot meters has reached 300 millions, and now exceeds the entire sales of gas in many German cities. There were carbonized 608,000 long tons of coal in the manufacture of 7100 million feet of gas; the latter volume representing an increase of 4·6 per cent. over the corresponding figure for the previous year. The unaccounted-for gas was 227 million cubic feet. The amount of gas made was 3532 cubic feet per head of the population; but if the district served by the Imperial Continental Gas Association is included in the returns, the volume per head becomes 4410 feet. The quantity consumed for the public lighting per head was 230 cubic feet, as compared with 237 cubic feet in the previous year.

Owing to the general rivival in trade, the demand for the coke during the autumn was better than in the former year; and the strike of the coal-miners in January, 1905, caused a temporary increase in its price. On the other hand, the unusually low state of the rivers produced some interruption in the steamer traffic. Coals were purchased at a lower price than before; but the petroleum needed in the public lighting cost more. Higher prices were obtained for retort carbon; but the prices of tar and liquor remained sensibly the same. Bye-products brought in about £21,500 more than in 1903 4. The net profit amounted to £325,700—an increase of about £82,100 over the previous year. At the end of March, 1904, the total capital expenditure of the undertaking stood at £5,161,000. During the next year, £396,000 was spent; bringing the present total to about £5,556,000. The book value of the undertaking stands at £4,553,000, after allowing for the depreciation of buildings, &c. The loan capital stands at £2,564,300; the sum brought forward is £102,200; and outstanding debts are £3600. This total of £2,670,000, deducted from the sum previously mentioned, leaves £1,883,000 as the net value of the undertaking at the end of last March—an increase of £47,500 over the previous year. During the year in question, the municipal authorities received : (1) 3·5 per cent. of the total profits made since the beginning of 1868 (£15,400); (2), the value of the gas supplied free of cost—roughly 450 million feet taken at about 2s. 9d. per 1000 feet—for public lighting (£65,100); and (3), the value of the attendance upon these lamps (£3600)—total, £110,600. Adding to this the increase in the net value of the undertaking (£47,500) and the net profit for the year of £325,700, the Municipality have made a total profit of £483,800—an increase of £54,200 over the corresponding amount for the previous year.

Of the coal carbonized, 78·7 per cent. was German and 21·3 per cent. English; the amount used being 3·8 per cent. more than in the previous year. The volume of gas made was 4·6 per cent. greater than before. For the first time since the undertaking was started, the maximum daily demand for gas has exceeded a million cubic metres. At the time of maximum demand, 381 benches, with 3120 retorts, were under fire; 41·1 per cent. of them being inclines. The average daily make per active retort was 102,700 cubic feet for a single 5-hour charge of 410 lbs. of coal; but in one factory where larger retorts are used, which take 530 lbs. per charge, the make was 121,500 feet. The average age of the furnaces that had to be rebuilt was 1022 days; and the average make of gas per worn-out retort was 9,440,000 cubic feet. The heating value of the gas varied from 136 to 151 calories per cubic foot; and the amount of sulphur compounds in it (from both English and German coal) was 18 grains per 100 cubic feet. The consumption on the heaviest day was 12·1 per cent. more than in the previous year. There were 12,258 ordinary meters installed, making a total of 176,314 in service; and 5207 slot meters—making 22,146 in all. The average annual consumption of these meters was about 31,770 cubic feet. During the year, 7·14 per cent. of the slot meters had to be sent to the makers for repair. There were 10,270 complete installations, comprising slot meters, also finished during the year; and these cost the undertaking 103·84 marks (5·3 marks less than in the previous year) net to fit up. Of the applications for these installations, 46·23 per cent. referred to premises containing two rooms and a kitchen. The average consumption of gas in these services was 15,800 cubic feet per annum; and the average monthly consumption per meter was 1300 feet.

The number of gas-engines in service at the close of the year was 829, having a total capacity of 7991 nominal horse power; the figures showing decreases of 89 engines and 160-horse power. The average gas consumption has somewhat increased, probably by reason of the smaller units being used no longer. The decrease in power supplied must be attributed to the competition of suction gas and electricity. The make of coke was equal to 75·5 per cent. of the coal carbonized, An amount equal to 57 per cent. of the coal was sold; and 18·5 per cent. was used in the factories. The yield of tar was 50 kilos., and that of liquor 111 kilos., per metric ton of coal. The number of incandescent lights in the streets at the end of the period under review was 30,297—an increase of 468. There were 17,149 ordinary incandescents in single lanterns, 11,830 in double, 558 in triple, and 40 in five-light lanterns; 42 lanterns with single Millennium lights, and 574 with double ones; 64 with two "Selas" burners, and 40 with single Lucas burners. Each burner required on an average 9 mantles and 2·2 chimneys; the average lifetime of the mantles being 40·6 days, and of the chimneys 165·9 days. The total staff employed by the undertaking in the distribution of gas and the service of the public lamps in Berlin and its suburbs now amounts to 571 persons. There are 420 lamplighters and 50 fitters to clean and adjust the lights. The mantles are flared off and put on the burners by women. The use of electric arc lamps in the streets and squares continues to grow, 31 new arcs having been installed. Where possible, glow lamps are being superseded by Nernst lamps. Petroleum lighting is diminishing, 60 lamps having been superseded by incandescent gas-lights. Incandescent spirit lamps are still limited in number to the nine in front of the Goethe memorial in the Tiergarten. During the past year, they have been changed for apparatus of better construction.

SHREWSBURY AND THE SULPHUR CLAUSES.

The Company's Bill to be Opposed.

The Shrewsbury Town Council, on Monday of last week, had a lengthy discussion as to the advisability of opposing the Bill which the Gas Company are promoting, with other Companies, with the object of removing the sulphur restrictions at present imposed upon them.

Alderman DEAKIN, in moving that the Bill be opposed, explained that in 1878 the Company promoted a Bill giving them additional powers with regard to extensions of works, &c.; and this would have been opposed, but for the Company consenting to insert clauses regulating the illuminating power of the gas and its purity from sulphur compounds. The Company had now joined with others to get rid of the sulphur restrictions; and if this effort succeeded, they would have no guarantee as to the purity of the gas in this respect. Experience of the localities where there were no such restrictions was that the amount of sulphur was multiplied three or four times. But to be perfectly fair to the Company, he wanted to say at once that in an interview the Chairman had assured him that the Company were going to use the same precautions in the purification of gas in the future if they obtained their Bill. He was, however, unable to get any undertaking to this effect; and if he had, of course, it would not be binding. Therefore, if the town lost this very important clause protecting their interests under the Act—and their experience was that of other towns where they had not got the same protection—instead of having 20 grains of sulphur, it might be, as in one place, an average of 53 grains, and it went up as high as 75 grains. The Council would be lacking in their duty if they shirked responsibility in the matter, and did not join with the other authorities in opposing the repeal of these restrictions.

Alderman SOUTHAM seconded the motion, and said Alderman Deakin had plainly showed that it was necessary to retain the restrictions, or there might be an increase in the amount of sulphur compounds.

Alderman LLOYD said he did not in the least wish to oppose the motion; but he would like to ask Alderman Deakin whether there was machinery now that would more easily check the sulphur getting into the gas. Further, whether it was a fact that out of 700 gas companies there were only 50 who had any limit to the amount of sulphur; and also whether it was not a fact that in all new Acts the sulphur tests were not inserted.

Mr. MORRIS said if there was an invention such as Alderman Lloyd indicated, he saw no reason why the Gas Company should be so anxious to move in the matter. He thought the Council were quite justified in doing what Alderman Deakin asked, to protect them from any excess. He would like to know whether the expense of opposing the Bill was to be shared in equal proportions or based on the rateable value.

Mr. WOODHOUSE said it seemed to him that the Council, on behalf of the public, should oppose the Bill; and it should be opposed now more strenuously than if the same suggestion had come earlier. The danger in small cottages where penny-in-the-slot meters were largely used, would be very great if the companies were to have liberty to send out gas without these restrictions.

Alderman DEAKIN, in reply, agreed with Mr. Woodhouse, that now stoves were used so largely in badly-ventilated places, the clause was more important than ever. The cost of the opposition would be shared according to the size of the places represented. He thought it would be quite a moderate outlay. As to the question of it being more easy now to keep the sulphur out of gas, as far as his knowledge went, Alderman Lloyd had been wrongly informed. He pressed this matter very closely with the Chairman of the Gas Company; and the Chairman pointed out that their difficulty was that the purifiers were extremely erratic in work—influenced by temperature and climatic changes—and that it was very difficult indeed for them to guard against the admission of sulphur. There was a great degree of uncertainty; and this fact should strengthen their hands in insisting that they should have the restrictions to ensure that the greatest possible care should be exercised for the safety of the public. Alderman Lloyd was perfectly right in saying that there had been recent legislation affecting this matter. It came about by a report of a Departmental Committee appointed by the Board of Trade to go into the question of sulphur compounds in gas in the Metropolis. The Companies interested succeeded in getting from the Committee a report quite adverse to the public and in the interests of gas companies; and in this way some of the Metropolitan Gas Companies got rid of their responsibilities, and on that account some Provincial Companies had followed suit. But this was no reason why the Council should allow the protection contained in the Act of 1878 to lapse, and thus lose these advantages, without making a very great and determined effort to retain them for those they represented. He read the report with great care; and he (with others) differed very greatly from the conclusions arrived at. The evidence before the Committee was interested evidence—evidence of people connected very largely with gas companies. It was a very important document; but he disagreed entirely with it, and he hoped the Council, even though that was to some extent against them, would not withhold their hand, but would go on and oppose with all the power they could the removal of these restrictions. With reference to the point that in recent Acts of Parliament the clause was not inserted, Alderman Deakin said the explanation was that recent Acts were promoted by municipal corporations themselves; and that was a very different thing. The corporations supplying the gas were themselves the guardians of the public safety; and it was not at all necessary to include the clauses in their Acts. But when private companies were supplying gas simply for their own profit, and obtained a monopoly, then the local authority must, in the interests of the ratepayers, have protective clauses.

The resolution was adopted.

PRICE OF GAS FOR POWER AND HEATING AT BURTON.

Meeting Competition.

Those who are responsible for the administration of the Burton-upon-Trent Gas-Works are determined that the undertaking shall do its best to meet the competition of other sources of heat and power; and to this end the Gas Committee are proposing to make generous concessions to customers. At the meeting of the Town Council last Wednesday, the Mayor (Alderman Lowe) moved the adoption of the minutes of the Committee, which included the following notice of motion: That from the dates the respective indications of the meters are taken for the quarter ending March 31, 1906, the price of gas used exclusively for gas-engines or for heating purposes only, and registered

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 477.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
160,000	10	,,	7½	Do. 7 p.c.	14⅝—15½	..	4 16 9
200,000	5	Nov. 15	7	Bombay, Ltd.. . . .	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5—5⅛	..	5 1 10
50,000	10	Aug. 31	14	Bourne-) 10 p.c. . .	29—30	..	4 13 4
51,810	10	,,	7	mouth Gas) B 7 p.c. .	17—18	..	3 17 9
53,200	10	,,	6	and Water) Pref. 6 p.c.	15⅛—16½	..	3 12 9
380,000	Stk.	Aug. 16	12½	Brentford Consolidated	265—270	+2	4 12 7
300,000	,,	,,	9½	Do. New . . .	197—202	..	4 14 1
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130	..	3 16 11
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb. .	101—104	..	3 16 11
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	227—232	+4	4 17 0
246,320	,,	,,	8½	Do. A. Ord. Stk. .	162—167	..	4 16 10
460,000	20	Sept. 28	10	British	43—44	..	4 10 11
100,000	Stk.	Aug. 16	6	Bromley, Ord. 5 p.c. .	121—124	..	4 16 9
165,700	,,	,,	4½	Do. do. 3½ p.c. .	91—94	..	4 15 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	12⅛—13	..	5 7 8
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
150,000	20	July 13	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	17—17½	..	5 14 3
100,000	10	Oct. 27	4½	Do. 4½ p.c Pref.. .	10—10½	..	4 5 9
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,443,280	Stk.	Aug. 31	5⅛	Commercial 4 p.c Stk. .	117—119	..	4 7 4
560,000	,,	,,	5	Do. 3½ p.c. do. .	113—115	..	4 6 11
475,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	84—86	..	3 9 9
800,000	Stk.	,,	6¼	Continental Union, Ltd.	131—134	..	4 17 0
200,000	,,	,,	7	Do. 7 p.c Pref.	143—148	..	4 14 7
424,070	Stk.	—	5¼	Derby Con. Stk. . . .	125—127	..	4 6 8
55,000	,,	—	4	Do. Deb. Stk. . . .	108—110	..	3 12 9
486,090	10	Jan. 25	11	European, Ltd. . . .	22½—23½	..	4 13 7
354,060	10	,,	11	Do. £7 10s. paid	16—17	..	4 17 0
15,223,235	Stk.	Feb. 8	4⅛	Gas-) 4 p.c. Ord. . .	99—100*	+1	4 8 0
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	87—89*	..	3 18 8
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	108—110*	..	3 12 9
4,193,975	,,	Dec. 14	3	Coke) 3 p.c. Con. Deb.	88—90	+1	3 6 8
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	101—103	..	4 17 1
82,500	,,	,,	6½	Do. do. 5 p.c.	123—126	..	5 3 2
70,000	10	Oct. 13	11	Hongkong & China, Ltd.	20—21	..	5 4 9
3,800,000	Stk.	Nov. 15	10	Imperial Continental .	236—238	−2	4 4 0
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	95—97*	..	3 12 2
175,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c. .	123—128	..	4 13 9
561,000	Stk.	Aug. 16	10	Liverpool United A . .	239—241	..	4 3 0
£			p.c.				£ s. d.
718,100	Stk.	Aug. 16	7	Liverpool United B .	169—170	+1½	4 2 4
306,083	,,	Dec. 29	4	L'rpool Unit'd Deb. Stk.	109—111	..	3 12 1
75,000	5	Dec. 14	5	Malta & Medn., Ltd. .	4¼—4⅜	..	5 5 3
560,000	100	Oct. 2	5	Met. of) 5 p.c. Deb..	103—105	..	4 15 3
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	Nov. 15	3⅜	Monte Video, Ltd. . .	11⅛—12½	..	5 12 0
1,675,892	Stk.	July 29	4⅜	Newc'tle & G'tesh'd Con.	108—109	..	4 4 10
406,025	Stk.	Dec. 29	3⅜	Do. 3⅜ p.c. Deb.	98—100	..	3 10 0
15,000	10	Aug. 31	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	Nov. 30	8	Oriental, Ltd, . . .	148—151	..	5 6 0
600,000	5	Sept. 14	7	Ottoman, Ltd, . . .	6—6½	..	5 7 8
398,490	5	Apl. 28	6	Primitiva Ord. . . .	7—7½	..	4 0 0
796,980	5	Jan. 25	5	Do. 5 p.c. Pref. .	5¼—5½	..	4 10 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb. .	98—100	..	4 0 0
851,070	10	Oct. 13	7	River Plate Ord. . . .	12⅝—13¼	..	5 5 8
300,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. .	97—99	..	4 0 10
250,000	10	Sept. 28	7	San Paulo, Ltd. . . .	13½—14	+½	5 0 0
70,000	50	Jan. 2	5	Do. 5 p.c. Deb. .	50—52	..	4 16 2
135,000	Stk.	Sept. 14	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	244—246	..	4 1 4
523,498	,,	,,	10	Do. C	244—246	..	4 1 4
126,106	Stk.	Aug. 31	5½	Shrewsbury Ord. 5 p.c.	110—120	..	4 11 8
70,000	10	Sept. 28	10	South African	16—17	..	5 17 8
6,250,000	Stk.	Aug. 16	5½	South Met., 4 p.c. Ord.	130—132	..	4 3 4
1,895,445	,,	Jan. 11	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Aug. 16	5½	S'th Suburb'n Ord. 5 p.c.	123—126	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref. .	127—132	..	3 15 9
112,533	,,	Jan. 11	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	Nov. 15	5	Southampton Ord. . .	109—112	..	4 9 3
120,000	Stk.	Aug. 31	6¾	Tottenham) A 5 p.c. .	125—128	..	4 17 8
363,020	,,	,,	4¾	and) B 3½ p.c. .	99—102	..	4 13 2
125,000	,,	Dec. 14	4	Edmonton) 4 p.c. Deb.	105—107	..	3 14 9
182,380	10	Dec. 29	8	Tuscan, Ltd.	9½—10	..	8 0 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
30,000	Stk.	Aug. 16	7¾	Wands-) A 5 p.c. . .	—	..	—
255,636	,,	,,	6¾	worth) B 3½ p.c. . .	137—140	..	4 9 3
75,000	,,	,,	5⅛	and) C 3½ p.c. . .	113—116	..	4 13 6
69,416	,,	Dec. 29	3	Putney) 3 p.c. Deb. Stk.	82—85	..	3 10 7
745,872	,,	Aug. 16	5⅛†	West Ham 5 p.c. Ord. .	106—108	+1	4 14 11
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	123—126	..	3 19 4
193,300	,,	Dec. 29	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 14 9

Prices marked * are "Ex. div."

† Next dividend will be at this rate.

by separate meters, shall be: For gas supplied within the borough for gas-engines only: (*a*) When the quantity supplied per quarter is under 100,000 cubic feet, at the rate of 2s. 4d. per 1000 cubic feet. (*b*) When the quantity supplied per quarter on one premises is 100,000 cubic feet and under 750,000 cubic feet, at the rate of 1s. 9d. per 1000 cubic feet. (*c*) When the quantity supplied per quarter on one premises is 750,000 cubic feet and over, at the rate of 1s. 6d. per 1000 cubic feet. For gas supplied within the borough for heating purposes only, when the quantity supplied per quarter is 250,000 cubic feet and over, at the rate of 1s. 9d. per 1000 cubic feet. For gas supplied in Newton Solney and in Newton Road, outside the borough boundary, for gas-engines only: (*a*) When the quantity supplied per quarter is under 100,000 cubic feet, at the rate of 3s. 6d. per 1000 cubic feet. (*b*) When the quantity supplied per quarter is 100,000 cubic feet and over, at the rate of 2s. 11d. per 1000 cubic feet. At present the price within the borough for gas used for engines is 2s. 4d. per 1000 cubic feet; and for heating purposes (provided the quantity exceeds 250,000 cubic feet per quarter), the rate is the same. It is said that several firms who had contemplated the installation of producer-gas plants have expressed their willingness to stay their hand till the Council arrive at a final decision in the matter next month.

METROPOLITAN WATER BOARD.

Arbitration Expenses—Another Unexpected Gift.

The Ordinary Meeting of the Board was held on Friday—Sir R. M. Beachcroft in the chair. The Finance Committee reported that they had received from the Local Government Board a detailed statement of the expenses of the Court of Arbitration, the total of which was £25,165. The principal items were: Printing reports of proceedings (less sales), £4613; shorthand writers, £1001; salaries or remuneration of officers employed by the Court, £1851; remuneration of the Commissioners, £16,456; and rent of offices, &c., £565. The Chairman stated that, following on the communication he had received from Sir Edward Fry (see *ante*, p. 371), he had had a communication, dated the 3rd inst., from Sir Hugh Owen, in which he said: "In the past week I have received the cheque for the final payment to me as one of the Arbitrators under the Metropolis Water Act. During the year in respect of which the fee was sanctioned by the Local Government Board, I have received my pension from the State, amounting to £1200; and I propose that my remuneration as Arbitrator should be reduced by that sum, less the income-tax, which has been paid by me. I accordingly enclose a cheque for £1140." On the motion of the Chairman, seconded by the Vice-Chairman (Mr. J. Glass), the Board decided to place on record their appreciation of the course taken by Sir Hugh Owen, and to tender him their cordial thanks for his action. The Committee also reported on the subject of the sinking fund of the Chamberlain of London, and recommended that they should be authorized to make all necessary arrangements with him for the transfer to the Board of the stocks, shares, and other property held by him, and that the Bank of England should be instructed to cancel the sum of £191,184 of the Board's "B" stock when the transfer is effected. This was agreed to. The Committee were authorized to make arrangements with the Bank for a temporary loan not exceeding £120,000, on the 1st prox. The Water Examination Committee reported that the Director of Water Examinations (Dr. Houston) had submitted his second monthly report—for December last—of his chemical and bacteriological investigations into the quality of the London Water Supply, and that they had printed the report itself, leaving the appendices in manuscript. On the reception of the report, Lieut.-Col. Colville said he had had a complaint of the pollution of the Thames, and asked how far the Board were responsible for the water in the river. Dr. R. M. Beaton, the Chairman of the Committee, stated in reply that the water beyond the intake of the Board was under the control of the Thames Conservancy, and the Board were not responsible for it. Mr. Burt observed that the Conservators were doing anything and everything they could to ensure the purity of the water of the river.

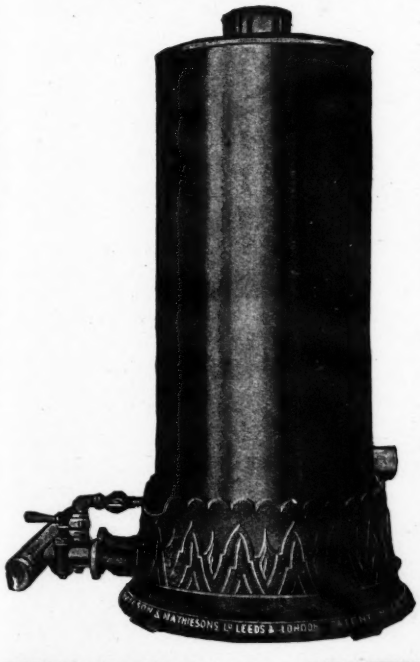
Opposition by Neath to the South Wales Water Bill.—At a recent meeting of the Neath Rural District Council, it was unanimously agreed to oppose the Bill promoted by the Glamorgan County Council. The Chairman (Colonel Gardner) said the Bill was excellent in many respects; but, having regard to the position of the Council, it was of the first importance that clauses should be inserted which would afford them protection. The Clerk to the Council said it was important that their area should be excluded from the Bill.

Walsall Corporation Gas Supply.—In the annual report of the Gas Committee of the Walsall Corporation, recently issued, they state that the balance-sheet of the gas undertaking for the past twelve months shows a net profit of £7373, against £5634 for the previous year. They regard this result as very gratifying, and as reflecting great credit on the management. It is proposed to contribute £6000 towards the rates—being an increase of £1000. Mention is made of the fact that the receipts through prepayment meters increased from £4303 to £5042.

Claim for a Water-Main.—A claim made by the Corporation of Morpeth, as owners of Morpeth Common, against the Corporation of Tynemouth, for compensation for injury done by the latter in laying their main through the lands of the Corporation, was submitted to arbitration. The length of the pipe-track across the Common was 876 yards, in the course of which there were six inspection chambers. The Arbitrators were Mr. John Lamb, of Newcastle, for the claimants, Mr. J. Aynsley, of Gosforth, for the respondents. They appointed Mr. R. W. Cooper, of Newcastle, as Umpire. He has awarded £297 as compensation.

HOT WATER THROUGHOUT THE HOUSE DURING THE SUMMER WITHOUT LIGHTING THE COAL FIRE BY THE WILSON

"CIRCULATOR" WATER HEATER.



This Heater is to be attached to the water pipes between the Kitchen Boiler and the Hot Water Cistern or Cylinder, and can be fixed in any convenient position in the Kitchen, Bathroom, &c., so that it is below the Cistern or Cylinder, and the result of its use is to heat the water in the Cistern or Cylinder by circulation the same as the coal fire; it does not interfere with the use of the coal fire boiler; either can be used separately, or both together if an extra quantity of hot water is required.

The advantages of the "Circulator" are—hot water can be obtained in **Hot Weather** without the coal fire, and in **Cold Weather**, by leaving the smaller burner alight during night when the fire has gone out, hot water is available in the early morning.

In ordinary use during hot weather about 100 feet of gas (costing from 2½d. to 4d., according to price of gas) will give 50 gallons of hot water, and we suggest that the smaller burner, consuming about 10 feet per hour be used for 10 hours each day.

It is constructed throughout of strong copper, tinned inside with pure tin. The cast-iron stand is fitted with a double concentric burner, the larger one to be used to heat the water quickly, and the smaller one for use during the day to maintain the constant supply of hot water.

Size of the "Circulator" over all—**9** inches diameter, **20** inches high to top of socket. The brass sockets are for ¾-inch iron pipe.

PRICE complete (as engraved) with Stand, Double Concentric Burner, and Tray,
£4 10s. 0d.

WILSONS & MATHIESONS, LTD., LEEDS & LONDON.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The members of the Scottish Junior Gas Association, Eastern District, visited the Leith Corporation Electric Power Station this afternoon. The visitors, of whom there were a good number, were received by Mr. J. Thomson, the Chief Assistant-Engineer, in the absence of Mr. Rutherford, the Engineer. Mr. Thomson went round the works with them, explaining the plant as he went. The works were inaugurated in 1898. For a time they were mostly employed for the lighting of the town; but last year an overhead electric street-car system was inaugurated, which now takes a great quantity of current. The plant is of 3000 indicated horse power, equal to about 220 kilowatts. There are six Lancashire boilers, evaporating about 8000 lbs. of water per hour each, and one Babcock and Wilcox boiler, evaporating 25,000 lbs. of water per hour. The latest and most powerful dynamo is one supplied by Messrs. D. Bruce Peebles and Co., Limited, of Edinburgh. There is at present in course of erection a push-plate conveyor for coal, by Messrs. Graham, Morton, and Co., of Leeds. At the conclusion of the visit, the President of the Association—Mr. J. Dickson, of Dunfermline, proposed a hearty vote of thanks to Mr. Thomson, and to Mr. Rutherford. In doing so, he said that what they had just had the pleasure of inspecting had furnished one more proof—if such were needed—of the need there was for the industry with which they were connected pushing still further ahead. It were idle to imagine that because at the present time in almost every case gas lighting could claim pre-eminence in the matter of cost over electricity, such would continue to be the case, and that they could therefore afford to jog along in the same groove. The use of electricity as a lighting and power agent was making great advances, as was shown by the fact that the cost of generation had been reduced almost one-half during the past ten years. Mr. Thomson, in briefly acknowledging the vote, expressed the pleasure with which he had received the Association.

The new gas-works at Kelty, Fifeshire, the erection of which was begun six or seven months ago, have been completed, and gas was sent out from them for the supply of consumers for the first time on Wednesday. Most of the shops in the town are now lighted by gas. The supply to private houses is being proceeded with as rapidly as it can be overtaken. The street-lamps are in course of erection. It will not be long before the Company are able to cover the whole area of supply. The community are highly pleased with the new illuminant.

The Kilmarnock Town Council on Wednesday considered a minute by the Gas Committee relative to the extra charge which is made for gas supplied through prepayment meters. In it information was given of the extra charges imposed in a number of towns where the annual make of gas is over 50 million cubic feet. Somewhat similar figures were before the Hamilton Town Council recently (*ante*, p. 180). Mr. Clunie said the users of prepayment meters were the people who could least afford to pay their gas bills, and yet they were asked to pay 7½d. more than those who could afford to pay. The Convener took the matter back.

The report of the Gas Committee, submitted to the Hamilton Town Council on Tuesday, stated that the Committee had again considered the matter of the increase of gas consumption in the Burnbank district, and that, in view of the possibility of the increase continuing, they had appointed a Sub-Committee to make inquiries as to possible sites for the establishment of additional gas-works. Bailie Hamilton, the Convener, explained that they were looking out for ground upon which to erect a gasholder in the first instance, but which also might be utilized for gas-works, should this be necessary in the future.

At a quarterly meeting of the Directors of the Markinch Gas Company this week, it was reported that there had been a considerable increase in the output of gas during the quarter. A good deal of discussion took place upon the small quantity of gas which was used for heating and cooking purposes in the town, as compared with other places. The Directors resolved that at the annual meeting of the Company they would support not only the proposal to reduce the price of gas for next year, but the suggestion to make a specially large reduction for gas consumed during the four summer months. They also agreed that inducements should be offered to consumers, in the shape of supplying stoves, cookers, and grillers.

On Thursday afternoon, there was a breakdown in the electricity supply of Dundee; and in the course of the work undertaken with a view to discovering the locality of the failure, a manhole cover in Urquhart Street was blown off with considerable force. The explosion was followed by a great tongue of flame springing into the air. One of the staff in the Electricity Department—Mr. C. Lamb—was standing close to the manhole, and while he escaped injury to his person, his clothes were extensively burned. The cover which was blown off was smashed into fragments on its fall. Fortunately, no one were injured.

Last night the mechanics employed in the Granton Gas-Works held their second annual supper in the Imperial Hotel, Edinburgh. Mr. W. R. Herring, the Engineer and Manager, presided over a company of about eighty. The Croupiers were Mr. A. Masterton and W. B. Leech. Mr. Masterton proposed the health of Mr. Herring. In acknowledging the toast, Mr. Herring referred to the good feeling which existed among the workmen, from the highest to the lowest, and said how well he was supported in the different departments. This was a source of very great satisfaction to him. He was proud of the works and of the staff. A very pleasant evening was spent.

Lighting by gas has attained its jubilee in Lerwick. It was first used on Feb. 9, 1856.

The annual meeting of the Moffat Gaslight Company was held on Wednesday. The financial statement of the Directors showed that £785 was available for dividend; and they recommended that it be applied in the payment of 2s. 6d. per share on the guaranteed shares, 15s. per share on £3000 paid-up ordinary shares, the placing of £100 to reserve fund, and the allowance of £50 for depreciation in the value of cookers, and the carrying forward of £310.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	St. Catherines (Remodelled)	250,000	Tonbridge	300,000
Windsor St. Works, Birmingham	2,000,000	Kingston, Pa.	125,000	Stretford	500,000
Saltley Works, Birmingham	2,000,000	Peterborough, Ont.	250,000	Oldbury	300,000
Colchester	300,000	Wilkesbarre, Pa.	750,000	Todmorden	500,000
Birkenhead	2,250,000	St. Catherines (Second Cont.)	250,000	Saltley, Birmingham (Third Contract)	2,000,000
Swindon (New Swindon Gas Co.)	120,000	Buffalo, N.Y.	2,000,000	York (Second Contract)	750,000
Saltley, Birmingham (Second Contract)	2,000,000	Winnipeg, Man.	500,000	Rochester (Second Contract)	500,000
Windsor St., Birmingham (Second Contract)	2,000,000	Colchester (Second Contract)	300,000	Newport (Mon.)	250,000
Halifax	1,000,000	York	750,000	Tokio, Japan	1,000,000
Toronto	250,000	Rochester	500,000	Pernambuco, Brazil	125,000
Ottawa	250,000	Kingston, Ont.	300,000	Malton	150,000
Lindsay (Remodelled)	125,000	Crystal Palace District	2,000,000	Duluth, Minn. (Second Cont.)	300,000
Montreal	500,000	Duluth, Minn.	300,000	Brockville, Ont.	250,000
Toronto (Second Contract, Remodelled)	2,000,000	Caterham	150,000	Smethwick	500,000
Belleville	250,000	Leicester	2,000,000	Gravesend	300,000
Ottawa (Second Contract)	250,000	Enschede, Holland	150,000	Newport (Mon.) (Second Cont.)	250,000
Brantford (Remodelled)	200,000	Buenos Ayres (River Plate Co.)	700,000	Toronto (Third Contract)	750,000
		Burnley	1,500,000	Toronto (Fourth Contract)	1,000,000
		Kingston-on-Thames	1,750,000	Montreal, Ont. (Second Cont.)	1,800,000
		Accrington	500,000	Hamilton, Ont.	400,000

Leeds, 1,800,000 C. Ft. Leicester (Second Contract), 1,000,000 C. Ft. Newcastle-on-Tyne, 1,800,000 C. Ft.

And, in addition, 8,150,000 Cubic Feet daily; also Coal-Gas Plants at Nelson, B.C., Chatham, Berlin, Napanee, Owen Sound, Calgary, and Winnipeg.

CURRENT SALES OF GAS PRODUCTS.

Week ending Feb. 17.

As regards pitch, London makers are so well sold that they are not in any way inclined to reduce quotations at present, notwithstanding the fact that the article appears to be easier in the country. In 90 per cent. benzol, nothing would now be done under 10d. Sixties crude carbolic acid may be called 1s. 9¾d. to 1s. 10d. net per gallon; but makers do not expect to have to accept anything under the latter figure. Creosote is from 1¾d. to 2d. net per gallon; and a fair quantity has very recently been done at between these figures. Sulphate of ammonia remains unchanged; but there is very little business in the article.

LIVERPOOL, *Feb.* 17.

Sulphate of Ammonia.

Although there has been a fair amount of inquiry, the bulk of new business has been disappointing, and a further slight decline in prices has to be recorded. There is no accumulation of stock in the hands of makers, but anxiety to market output is everywhere observable among the smaller makers; and this has tended to weaken the market. The closing quotations are consequently £12 5s. per ton f.o.b. Hull, £12 6s. 3d. per ton f.o.b. Liverpool, and £12 8s. 9d. per ton f.o.b. Leith. In the forward position there has been speculative offering abroad, and some selling, at a discount on spot prices, both for spring and summer months; and in face of this, first-hand business has been practically impossible, makers being all of them unwilling to sell unless at a substantial premium.

Nitrate of Soda.

This article is very firm in all positions; and spot prices have been advanced to 11s. 3d. and 11s. 6d. per cwt. for ordinary and refined qualities respectively.

LONDON, *Feb.* 17.

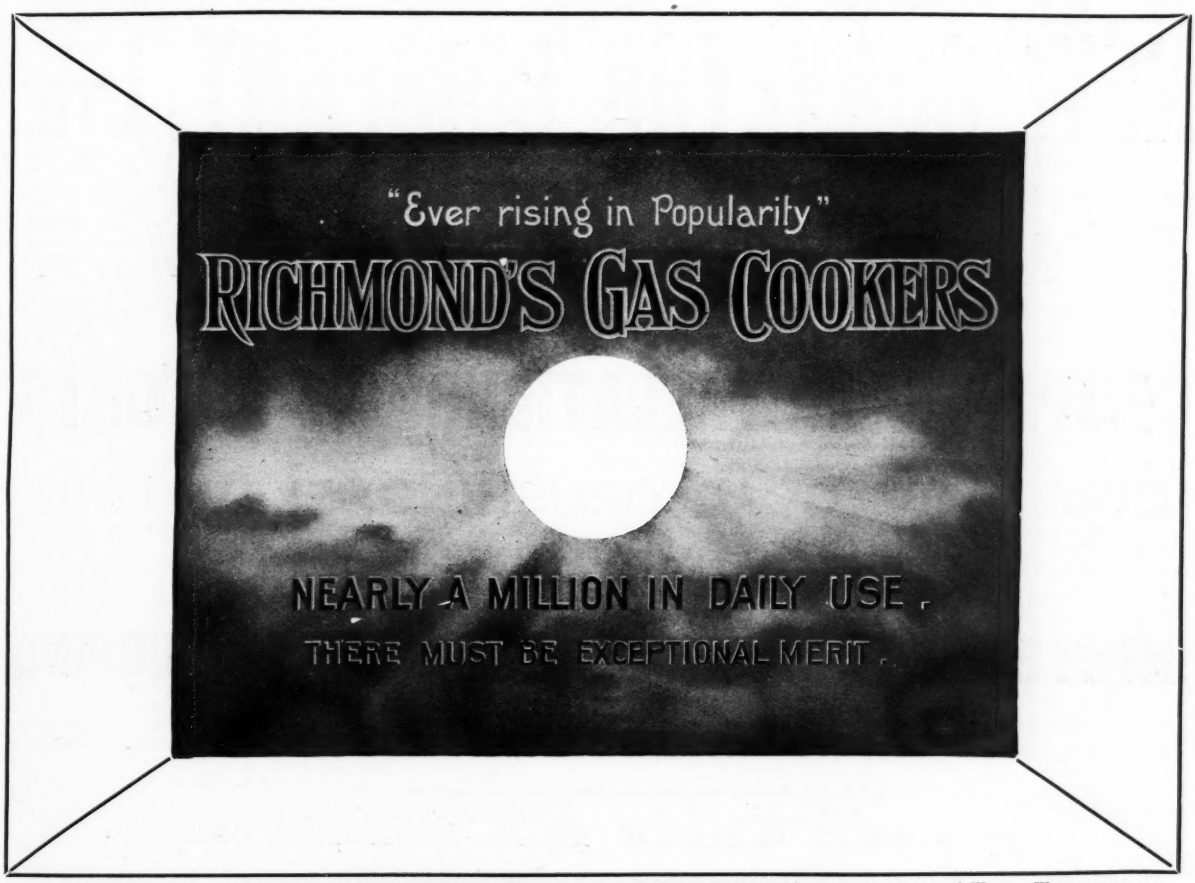
Tar Products.

Business has been quiet during the past week, and prices have had rather a downward tendency. Pitch has been very depressed, owing to the fact that several manufacturers are offering freely for February-June delivery, and seemed inclined to sell up to the end of the year, doubtless owing to the fact that several tar contracts have recently been arranged. Some second-hand parcels of London makes were sold at very low prices; but these can hardly be taken as a criterion of the general market, as the largest manufacturers are not pressing anything on the market just at present. The actual value in London may be taken as about 30s.; but it is very difficult indeed to fix same. So far as Yorkshire is concerned, business has been done at 28s. in several instances; while there are sellers at 28s. 6d. to the end of the present year, and rather large quantities appear to be now offering. In Lancashire, there are several manufacturers now anxious to sell, from which it would appear that the recent attempt to raise the market has resulted rather disastrously for manufacturers generally. So far as South Wales is concerned, there has been a little business doing during the past week; but consumers now say they are well supplied to the end of June, and are only interested in July-December delivery. The trade in patent fuel is undoubtedly good, both in Swansea and Cardiff; but supplies are more than equal to the demand. As regards the Continental consumers, they are open to buy for March-June, but only at prices considerably under those quoted even by dealers. There is really nothing doing in anthracene. One or two small parcels have been offered at 1¾d. without finding buyers; and the value cannot be taken as more than 1½d. for 40-45 per cent. "A" quality. In benzol a little business has been done in 90 per cent. for home consumption at prices equal to somewhere about 9¾d. f.o.b.; while it is reported that London refiners have accepted 9¾d. for March-June. Toluol is still in good demand for prompt delivery; but as manufacturers are not offering, the value may be taken as being 1s. 1d. per gallon. In solvent, the demand continues very good, especially for prompt delivery; but there is certainly more offering for March-June, while manufacturers show some desire to sell for July-December. In carbolic acid, there is still a very good demand for 60's at 1s. 9½d., at which price a fair business has been done during the past week; while in 50's an offer of 1s. 6d. is reported to have been declined for a considerable quantity—the maker holding for 1s. 6½d. Crystals are quiet; and English manufacturers are still sellers at 6d. for 39-40 per cent. So far as London is concerned, the market in creosote is decidedly quiet; though it is reported that a certain quantity was placed for export in barrels at a fairly good price. London makers are said to be asking 1¾d.; but it does not seem as if any actual business could be arranged at over 1⅝d. Yorkshire makers are not offering for early delivery; while in the Lancashire district, the market is decidedly easier, and there is more offering for March-June.

The average values during the week were: Tar, 17s. 6d. to 21s. 6d.; Pitch, London, 28s. 9d. to 30s.; east coast, 28s.; west coast, 26s. 6d. to 27s. Benzol, 90 per cent., 9¾d. to 10d.; 50-90 per cent., 10¼d. Toluol, 1s. to 1s. 0½d. Crude naphtha, 4¼d.; solvent naphtha, 1s. to 1s. 0½d.; heavy naphtha, 11½d. to 1s. 1½d. Creosote, London, 1⅝d.; North, $1\frac{7}{16}$d. to $1\frac{9}{16}$d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9½d. Refined naphthalene, £4 to £9; salts, 20s. to 22s. 6d. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been very quiet during the past week, and there has really been little business doing. Beckton still quotes £12 15s.; but this price is purely nominal, as buyers would not consider same for either prompt or forward delivery. In Hull, business has been done at £12 5s. and £12 6s. 3d., but only to a limited extent. In Leith, makers ask £12 10s. in any position. Buyers do not seem inclined to pay this price—believing evidently in an easier market later. Sales are reported in Liverpool at £12 6s. 3d. for early shipment.



ADVERTISEMENT OF THE RICHMOND GAS STOVE & METER CO., LTD. LONDON: 132, QUEEN VICTORIA STREET, E.C. OFFICES & WORKS: WARRINGTON.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The continuance of colder weather has had, and is still having, a good effect on the stocks of coalowners, who have long waited for a welcome increased demand for fuel for household requirements. Owing to this cause, more slack has become available; but it is readily absorbed by millowners and others who require it. Engine fuel of all kinds meets with a ready sale, at prices which have a hardening tendency. With the continued growth of cotton mills and weaving sheds in various parts of the county, the prospects of colliery owners are most encouraging. While the coal trade by the Ship Canal continues fairly satisfactory, it would be stimulated by the removal of the coal-tax, as it is known that a large business is pending. Favourable reports of the general condition of the coal trade in the Midlands are at hand. Quotations on the Manchester Coal Exchange are as follow: Best house coal 13s. to 14s. 6d., secondary 12s. to 13s., common 9s. to 10s., steam and forge 8s. to 9s., best engine fuel 7s. 6d. to 8s. 6d., best slack 6s. 6d. to 7s. 6d., medium 6s. to 7s., washed slack 7s. to 7s. 6d., common 5s. to 6s., at the pit's mouth. Coal for shipping is 9s. to 10s. Cannel continues in fair request, and coke is fetching good prices.

Northern Coal Trade.

There has been a limited demand for coal in the North-East of late; and this, and the fact that stormy weather has delayed the export, has made work less brisk at the collieries, and brought down some of the prices of fuel. Best Northumbrian steams are 9s. 1½d to 9s. 3d. per ton f.o.b., for second-class steams 9s. is quoted, and steam smalls are firm at 6s., and are rather scarce at present. This quietness in steam coals is usual at this time of the year when the northern shipments are light. In the gas coal trade, there is a good demand, though the shipments to the great consumers are now less than they were. For occasional cargoes, Durham gas coals vary from 9s. to 10s. per ton f.o.b. according to quality; but for forward delivery prices seem firmer, and some of the best gas coals are tending higher. The settlement of the Swedish gas coal contracts seems to make the coalowners more decided in asking higher figures for fuel for future contracts; and it is said that they hope that the advances of 1s. to 1s. 4d., which have been known in those recently decided, may be repeated in others yet to be settled—because the active demand for coal generally in Durham lessens the quantity to be put into some markets. In coke, the market is firm; but gas coke is still abundant, and there is a weakness about the price when large quantities are concerned. Good gas coke is quoted at 11s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade is a shade quieter, which is attributed to the easing off of the demand for gas-works, on account of the lengthening days; splint being especially plentiful. For other varieties, the demand remains unchanged; the outputs being readily taken up. The prices quoted are: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 6d. to 9s. 3d., and splint 9s. 9d. to 10s. The shipments for the week amounted to 252,588 tons—an increase of 2717 tons upon the preceding week, but a decrease of 13,243 tons upon the same week of last year. For the year to date, the total shipments have been 1,282,151 tons—an increase of 60,109 tons upon the corresponding period of 1905.

Income-Tax on Municipal Revenue.

At Derby, last Wednesday, the Corporation were the appellants in an interesting case brought before the local Commissioners under the Income-Tax Acts. The Town Clerk of Derby (Mr. G. Trevelyan Lee) appeared for the appellants; Mr. Rickman, an Inspector under the Inland Revenue, conducted the case for the respondents. The Town Clerk said the principal point to be raised was with respect to the right of the Corporation to retain tax deducted from dividends and interest paid by them in respect of borrowed money. The Corporation claimed that the whole of the dividends and interest, without regard to any particular fund, must be added together, and considered to have been paid out of all the profits or gains brought into charge to the income-tax; also that they were entitled to retain the tax deducted, except so far as the amount of dividends and interest might exceed the assessment; and, further, that they were not assessable to income-tax under the Act of 1842. The Inland Revenue authorities admitted that the Corporation could deduct and retain tax on interest paid out of profits already brought into charge, but contended that they must be treated as two separate bodies—viz., as a municipal authority and as an urban sanitary authority—and not as a whole. This was the main point at issue. The Town Clerk declared that the Corporation was one body, and pointed out that there was no distinction, in the conduct of their business, between municipal and sanitary work. Mr. Rickman's contention was that the Corporation were assessable as two separate bodies, in support of which he pointed to the fact that the borough fund and the district fund were kept distinct. Eventually the Commissioners decided in favour of the Corporation, regarding them as one body, and therefore entitled to the set-off they claimed. One effect of this will be a saving of between £400 and £500 per annum. The Board of Inland Revenue will likely appeal against the ruling of the Commissioners.

The Local Government Board have put a check on municipal extravagance by declining to entertain the proposal of the Acton District Council to erect a new Town Hall and Municipal Offices, on the ground that the scheme is too costly. The Council recently went to the expense of £3745 for architect's and surveyors' fees, and so forth, in contemplation of a structure that would cost £100,000. The ratepayers generally regarded this as unwarrantably extravagant, and a meeting of protest was held. The Local Government Board's reply is extremely pointed. It condemns the Council's project as unnecessarily elaborate and expensive; and the Board refuse to grant a local inquiry.

NEW CONVEYOR COMPANY, LTD.,

Transport Appliance Works,

SMETHWICK, BIRMINGHAM.

COMPLETE INSTALLATIONS OF RETORTS.

COMPLETE COAL CRUSHING, ELEVATING, AND CONVEYING PLANTS.

COMPLETE HOT & COLD COKE CONVEYING, CRUSHING, AND SCREENING PLANTS.

PLEASE WRITE FOR ESTIMATES.

Telegrams: "Aptitude, Birmingham." **Telephone: 50 Smethwick.**

Electricity v. Gas in Hackney.

The Electric Lighting Committee of the Hackney Borough Council, in a report issued recently, stating that they have decided to make important reductions in the price of current, say: "The Gas Company is making the most strenuous efforts to promote its business, and it is necessary, therefore, to take active steps to assure the continuance of the goodwill and custom of our consumers." The price for private lighting, which is now 7d. and 1d. per unit on the maximum demand system, with an optional flat-rate for old consumers of 4d., is, after the 1st of April next, to be 6d. and 1d., with a general optional flat-rate of 3½d. Concessions are also to be granted to consumers of current for power and heating purposes. Possibly in order to make up for the loss sustained by the severity of the gas competition as regards private consumers, it is proposed to replace gas in nine streets and roads by 7-ampere arc lamps. The estimated cost of maintenance under the new system is £1248 per annum, against £676 18s. 7d. now being paid for gas. The nine streets and roads in question are at present lighted by flat-flame burners. It is proposed by the Works Committee, if their scheme as regards these streets and roads is adopted, that in the remaining portions of the borough lighted with flat-flame burners, incandescent gas lighting should be introduced.

Gas v. Electric Lighting at Crediton.

In accordance with a previous decision, the Crediton Urban District Council held a special meeting last Saturday week for the purpose of considering whether it was expedient to oppose the Bill for incorporating the Crediton Gas Company, Limited, under the title of the Crediton Light and Power Company. Mr. Schultze, the Chairman of the Company promoting the Bill, and Mr. F. Christy, of the firm of Messrs. Christy Bros. and Middleton, who held a Provisional Electric Lighting Order which has now expired, attended the meeting. In reply to questions, Mr. Christy said his firm were prepared to find the capital for the supply of electric light and power if a certain guarantee was forthcoming as to the number of lights the townspeople would take. Mr. Schultze said his Company's view was that the supply of electricity by them must depend entirely upon the wishes of the townspeople. If there was a demand for it, and his Company had the power to supply, they would undoubtedly do their best to satisfy the demand. The Council could get all they wanted under a sealed agreement. Messrs. Christy Bros. and Middleton had shown how little importance they attached to the matter by not carrying out the Order they had had for two years. On the suggestion of the Chairman (General Sir Redvers Buller), it was resolved to oppose the Bill, but to discuss the matter on a business basis with Messrs. Christy and Schultze.

Standard Screw-Threads for Gas-Pipes.

The Engineering Trade Section of the London Chamber of Commerce discussed this question at their meeting last Tuesday; particularly with reference to the complaints from merchants and users that the tubes of one maker, although nominally screwed to standard threads, will not fit those of another maker. Mr. Le Bas said this want of interchangeability was causing serious loss to British export trade. American manufacturers contrived to screw their tubes so as to be practically interchangeable; and thus they frequently got business which otherwise might be sent to this country. Mr. Barber, of the Davis Gas-Stove Company, confirmed this view of the matter, and expressed the opinion that the Chamber might help to mitigate the mischief by calling the attention of manufacturers to the serious inconvenience accruing to merchants in having consignments thrown on their hands because they were not to the proper standard. The Chairman (Mr. Meek) thought the difficulty would be met if buyers were instructed to specify more precisely what they required. After some discussion, it was agreed that the Secretary should write to the various Chambers of Commerce in our Colonies and dependencies, as well as to Chambers in foreign countries, calling their attention to the existence of standard threads for tubes, and suggesting that buyers should specify that all tubes to be supplied should be screwed to these standard threads. Our contemporary the "Ironmonger," referring to the foregoing remarks, points out again that the Engineering Standards Committee have the matter in hand, and that it is hoped shortly to provide actual standard gauges or templates to which pipes may be specified.

Halifax Gas Profits.

Last Friday's issue of the "Yorkshire Observer" contained the following paragraph on the subject of the Halifax gas profits: Behind the scenes within the Halifax Corporation a contest is in progress for the disposal of the year's gas profits, which may have an important effect on the rates for the ensuing year. For a long time the gas-works have supplied a succession of harassed Chairmen of the Finance Committee with convenient funds wherewith to keep down the rates; and accordingly the estimates for the closing year hypothecate £9227 from gas profits for that purpose. Twelve months ago the Gas Committee uttered their protest against the proceeding; one member even warning the Council to beware of killing the goose that laid the golden eggs. The Committee share the general anxiety that the rates should, at least, not increase; but their first consideration is naturally directed to securing the soundness of the works under their care, and they contend that to achieve this a large proportion of this year's gas earnings must be absorbed in connection with the works. They cannot hope that the profits will always be as large as they have been; and already increasing competition in the way of private gas plants is forcing them to substantially reduce the price for motive power. We understand, however, that an accompanying reduction in the price of gas for lighting purposes, which was proposed, is not likely to be made for the present. During the year, the old coal-stays and siding at the gas-works have had to be replaced at a cost of £7000, though interest and sinking fund will have to be paid upon them for twenty years to come. For this reason, it is urged that the new stays and siding should be paid for out of revenue. The Gas Committee also wish to put something to the reserve fund, and to establish a reasonable working balance, which would obviate the necessity for overdrafts at the bank.

THE

PARKINSON

"CROWN"

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SHOWING HOT-PLATE

HINGED TO FACILITATE

CLEANING OF BURNERS, &c.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

The County Council's Opposition to Bills.

At the meeting of the London County Council to-day, the Parliamentary Committee will report on the above matter. On the 30th ult., the Council authorized petitions to be sealed and presented, if necessary, against various Private Bills affecting the County of London. The Committee were advised that any opposition on the part of the Council to the Wandsworth and Putney Gas (Removal of Sulphur Restrictions) Bill, the Gas Companies (Removal of Sulphur Restrictions) Bill, the South Suburban Gas Bill, the Metropolitan Water Board (Lea Valley) Bill, and also all the Electric Supply and Power Bills, should be undertaken under the provisions of the Municipal Corporations (Borough Funds) Act, 1872. Notice was accordingly given that the question of opposing the Bills would be considered by the Council at the meeting to-day, when it will be necessary to pass a formal resolution to oppose the Bills, and to defray the costs and expenses of so doing out of the county fund. The resolution must be passed by an absolute majority of the whole number of the Council; and subsequently they will have to obtain the approval of the Local Government Board to the course of action to be taken. The Committee have presented a petition against the Glamorgan and South Wales Water Bill; and they will ask the Council to formally sanction their action.

Rural Water Supplies in Essex.

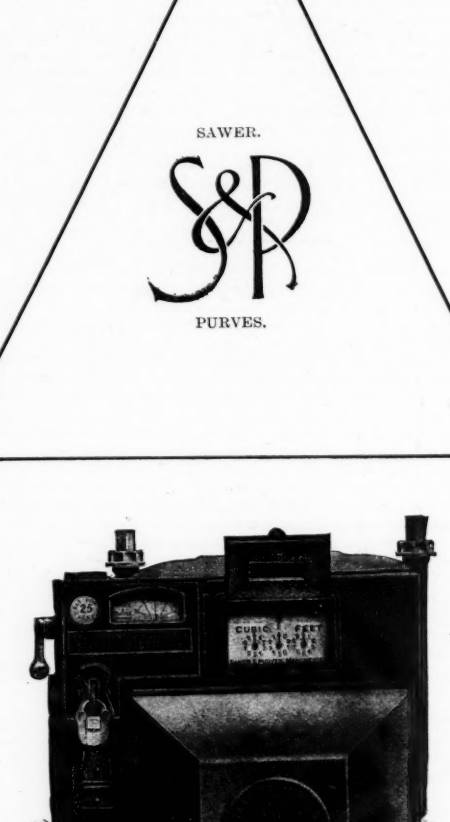
In the course of his annual report to the Chelmsford Rural District, Dr. Thresh refers to the important question of water supply, and remarks on the fact that a very large portion of the district is now served through mains. "Altogether," he says, "there must be some 25 miles of water-mains ramifying the various parishes supplied from the Great Baddow, Danbury, Waltham, and Ingatestone works. Every year sees the mains extended; but only a few of the extensions asked for can be carried out on account of the expense. Fortunately, the advantages of a good and abundant water supply are now so well recognized, that owners of property not infrequently offer to pay considerable sums to secure extensions. By the aid of these contributions, the mains have, during the past year, been extended in Sandon, Woodham Ferris, and Ingatestone. The Writtle Water-Works are at last completed, and water is now being laid on to the houses. These works have cost about £7000. The annual expense, including repayment of the loan, will be about £550 a year. The sewerage and water supply of this village, with its 250 houses, will cost about £1000 per annum. It is no wonder that other villages absolutely refuse to listen to any suggestions for providing a public water supply or a system of sewers when they hear of such an expenditure. The first scheme suggested would have supplied water and sewers for a cost of about £3000; and although it would not have been so satisfactory or comprehensive as the one just completed, it would probably have been all that was necessary for putting the parish in a good sanitary condition."

Economy of Incandescent Gas Lighting.—A statement as to the financial effect of the adoption of incandescent lighting in the public lamps was presented to the Liskeard Town Council last Tuesday. Mr. W. H. Huddy, the Chairman of the Lighting Committee, said the public and the Council were gaining considerably by the change which had been made. During the latter half of 1904, the quantity of gas consumed was 434,600 cubic feet, and the cost £81 10s.; while in the corresponding period of 1905 the quantity was 365,000 cubic feet, and the cost £68 10s. There was thus a saving of 70,000 feet of gas and of £13 in the cost, while they had a far better light. The cost of installing the new lanterns and burners had been kept below the estimate of £150; while their maintenance had not exceeded the amount previously paid to the Gas Company. The saving in the consumption of gas in ten years would be sufficient to pay for the installation of the incandescent system.

Reductions in Price.—The Directors of the Dorchester Gas Company have reduced the price of gas used for power purposes by 10 per cent. on the present figure. The Cambridge University and Town Gas Company intend to reduce their price 2d. per 1000 cubic feet as from the 31st of March next. The Directors of the Sheffield United Gas Company have decided to make a further reduction of 1d. per 1000 cubic feet in the price of gas after the reading of the indices for the March accounts. At the recent meeting of the Scarborough Gas Company, prospective reductions of 1d. per 1000 cubic feet for the town and 3d. for Scalby were announced. The Yeadon and Guiseley Gas Company have decided to reduce the price of gas 1d. per 1000 cubic feet; bringing it down to 2s. 7d. The Devizes District Council have decided to reduce the price of gas to large consumers. Those who use up to 100,000 cubic feet per annum are allowed 5 per cent. discount on 3s. 4d., making it 3s. 2d. It will now be 3s. 1d. between the above-named quantity and 150,000 cubic feet; from this up to 400,000 cubic feet 3s.; and above it 2s. 10d.

Kirton Gas Supply.—A public meeting of persons interested in the lighting question at Kirton was held last Wednesday. For many years the Kirton Gas Company have been working under great difficulties. The concern has never been a paying one; and of late, owing to the largely increased consumption of gas, the producing capacity of the works has been inadequate to meet the demand. The shareholders at last decided to put an end to this unsatisfactory state of things, and resolved that the Company should be wound up. The present position of affairs was placed before the meeting; and it was stated that a gentleman had offered to purchase the property. It was shown that new mains had been laid during the last year or two, the cost of which had come out of revenue. It was argued that, with improved plant, the present consumption of gas should show a profit. There was a general opinion that it was not desirable that the supply of so important a commodity as gas should pass into private hands; and, after much discussion, a Committee was appointed to approach the Parish Council, and ask them to consider the question of the purchase by them of the Company's property.

SAWER.
S&P
PURVES.



MANCHESTER.
M&N
NOTTINGHAM.

Holywell Water Supply.—The Local Government Board have given their sanction to the borrowing by the Holywell Urban District Council of the necessary money to purchase the old reservoir below St. Winefride's Well for the purpose of a water supply for the town. It is intended to take water from the well, run it into the reservoir, where it will be filtered, and then pump it up to a second reservoir above the town, whence it will be distributed.

Crimean Veteran's Sad Death.—On Sunday, when a relative went to call an old couple—John Gray, a Crimean veteran, and his wife—who were living at Kirkcaldy, she received no answer to her knocks at the door. The neighbours proceeded, in consequence, to burst into the house, and on doing so they were met by a rush of coal gas. The painful discovery was afterwards made that the aged pair had been suffocated as they slept. The occupants of a neighbouring tenement also detected a strong smell of gas at midnight; but they were fortunate enough to escape its effects by opening their windows.

Carlisle Public Lighting.—At the meeting of the Carlisle Town Council last Tuesday, it was reported that the Public Lighting Committee had decided to substitute incandescent burners for the present flat-flame burners in a number of streets in the city, the names of which were given. The Committee's action was approved. At the same meeting, it was mentioned that the Gas Engineer (Mr. W. J. Smith) had made arrangements with the Automatic Light-Controlling Company, Limited, for the hire, fixing, and maintenance of apparatus for automatically controlling the lighting of the public gas-lamps for the term of three years.

The Llandrindod Wells District Council and the Gas Bill.—A special meeting of the Llandrindod Wells Urban District Council was held on Monday last week to further discuss the amended clauses in the Bill of the proposed Gas Company. The Solicitor to the promoters (Mr. E. P. Careless) was in attendance. The Clerk (Mr. D. C. Davies) read the new clauses and amendments to the Bill as returned from the promoters' Solicitor, with the latter's comments; and the matter was discussed at some length. Eventually it was resolved to take the necessary steps to oppose the Bill; but the Council also decided to meet the promoters' Solicitor again and discuss other amendments.

Suicide by Gas.—The death occurred last week of a woman named Clara Gordon, the housekeeper to a Mr. Brown, living in Laleham Road, Lewisham. Deceased was found lying on a sofa in the front parlour of the house, the door and windows of which were closed. Both taps of the gaselier were turned on, and to one was affixed a piece of rubber tubing, the other end of which was in deceased's mouth. Death was due to coal gas poisoning. Subsequently a letter was discovered, stating that the writer was alone in the world. Other letters were found in the kitchen warning people to be careful as they entered the parlour, and not to strike matches, but to leave the door and windows open for a time.

Uncertainty of the Electric Light.—At a recent meeting of the Newport (Mon.) Guardians, an attempt to hush up a failure of the electric light at the Workhouse during an entertainment, by excluding reference to the occurrence from the report presented by the Visiting Committee, was frustrated by Mr. Donovan, who asked for an explanation. Mr. Evans, who brought up the report, said that it was only a trivial matter, and that there was no need to put it in the report. It might happen in any house. Mr. Stevens remarked that an operation was to be performed in the theatre that day; and if it were being done when the light went out, the doctor would not be responsible for the consequences. Mr. Searles stated that the light was only out for some ten minutes or a quarter of an hour. The Chairman said the Clerk would communicate with the Borough Engineer. It would be serious if the light went out during an operation.

The Shanklin Gas Company and their Employees.—At the recent annual meeting of the Shanklin Gas Company, at which, out of a balance of £2719, dividends of 10 and 7 per cent. were declared, the Chairman (Mr. F. Cooper) in proposing a vote of thanks to the Secretary and Manager (Mr. F. C. Taylor), remarked that he had now completed 25 years' service with the Company. As showing the development of the concern, the Chairman stated that when Mr. Taylor joined the Company the output of gas amounted to 5 million cubic feet per annum; whereas now it was 27 millions. They had very little machinery 25 years years ago; but now they had some admirably equipped works. The motion having been cordially adopted, Mr. Taylor made suitable acknowledgment. The next evening all the employees were invited to dinner in the Board-room. Mr. Taylor presided, and the Chairman, Vice-Chairman (Mr. R. Young), and two Directors were present. After dinner, the usual loyal toasts having been enthusiastically honoured, the Chairman proposed "Success to the Shanklin Gas Company," to which Mr. Cooper responded. He next submitted "The Chairman and Directors;" and paid a high tribute to the interest always shown by the Board in the work of the Company and the welfare of the employees. Mr. Young and Mr. Deeks (a Director) responded, and expressed the hope that the excellent relations between the Board and the staff that had existed hitherto would always continue. "Health and Prosperity to all the Workmen employed by the Company," and "The Manager and the Clerical Staff," were duly honoured; and the proceedings closed with the National Anthem.

Following the recent announcement in the "JOURNAL" in regard to the price of thorium and of mantles, we have been informed by Mr. H. Maisner, of No. 104 and 105, Great Saffron Hill, E.C., and Sole Agent in the United Kingdom of the Export Gas-Mantle Company of Berlin, that the prices of all mantles supplied by him have been reduced.

The Atherstone Gaslight and Coke Company, Limited, has been registered with a capital of £13,000, in £1 shares, to acquire the undertaking carried on at Atherstone, Warwick, as the Atherstone Gaslight and Coke Company; to adopt an agreement with W. F. S. Dugdale and others; and to manufacture and supply gas for light, heat, motive power, and other purposes in Atherstone and elsewhere in the counties of Warwick and Leicester.

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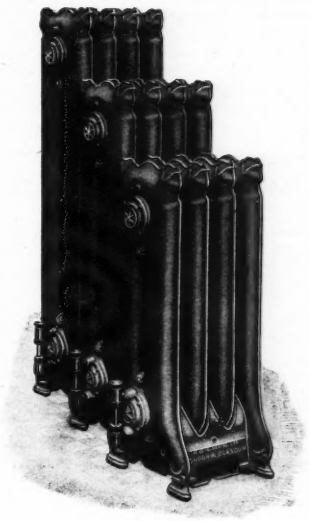
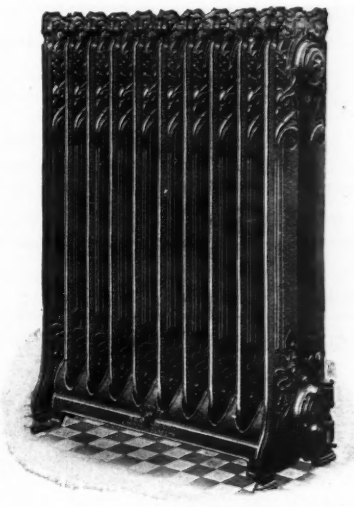


Plain Design.



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Sanction has been received from the Local Government Board to the borrowing of £20,060 for the extension of the Burnley Gas-Works, and £2435 for the purchase of property adjoining, which is required for the purpose.

At the recent annual meeting of the National Gas-Engine Company, Limited, the report, noticed in the "JOURNAL" for the 6th inst., was adopted, and £10,000 was added to the reserve fund, bringing it up to £60,000. Mr. Dugald Clerk, M.Inst.C.E., was unanimously elected a Director of the Company.

Electrical Improvements, Limited, is the title of a Company which has been registered with a capital of £2000, in £1 shares, to acquire certain inventions relating to improved methods of electrically turning on and lighting up street and other gas-lamps; to acquire from W. Pare certain patents relating to these inventions; and to carry on the business of electricians, mechanical and general engineers, producers and suppliers of electricity, motive power, and light, &c.

At the Mistley Petty Sessions a few days ago, two lads, named Hinchley and Dearsley, were charged with breaking into a dwelling-house at Great Clacton and stealing £1 19s. from a gas-meter. The house in question was the seaside residence of a lady in London, who prosecuted. The theft was clearly proved; and the Chairman of the Bench (Canon Norman) said it was as deliberate as any adult could have perpetrated. Hinckley was fined £1, or fourteen days, and Dearsley 10s., or seven days. The latter fine was paid by the father of the lad. Hinchley's mother wrote that she had no money to appear on his behalf; and the fine in his case was generously paid by the prosecutrix.

Messrs. F. C. Sugden and Co., of Leeds, have had an order placed with them for a third installation of regenerator settings and ironwork, consisting of 32 mouthpieces, at the Yeadon and Guiseley Gas-Works.

The annual dinner of the Newport (Mon.) Gas-Works Benefit Society was held on Monday evening last week—Alderman T. Canning, Assoc.M.Inst.C.E., the Engineer and Manager of the Company, presiding. Among those present was the Manager (Mr. J. Liscombe). The usual loyal and patriotic toasts having been honoured, Mr. J. Southwood Jones submitted "The Chairman and Directors of the Newport Gas Company." Mr. C. D. Phillips, replying, said all the Directors took the greatest interest in the Society. The more the members did for themselves, the more the Directors would do for them. He urged all the employees to become members. "The Mayor and Corporation" having been proposed by Mr. J. H. Canning and responded to by his Worship and Alderman Greenland, Mr. T. H. Hazell (the Secretary of the Company) submitted "Success to the Town and Trade of Newport," and Aldermen Morley and Howell acknowledged the toast. Alderman Greenland proposed "Success to the Gas-Works Benefit Society." He described it as a most sound institution, and spoke of the very useful work it was doing. Mr. J. Whitefield (the Secretary), responded. He said that, according to the balance-sheet, the receipts for the year, including workmen's contributions, donations, &c., amounted to £421 14s. 2d. After making allowance for sick payments, funeral grants, and other expenses, there was left a balance of £177 18s. 5d. The members contributed £38 18s. 6d. to the Newport and Monmouthshire Hospital. Other toasts followed; and a pleasant evening was spent.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

TRAVELLER. No. 4562.
FOREMAN. Dumfries Gas Works.
FOREMAN FOR SULPHATE WORKS. No. 4459.
GENERAL CLERK. Littlehampton Gas Company.

Situations Wanted.

FITTER. C. T., Herne Bay.
GAS AND WATER FITTER. No. 4563.
INSPECTOR, &c. No. 4557.
PLUMBER AND GAS FITTER. No. 4560.

Books (Second-Hand) for Sale. No. 4538.

Plant, &c. (Second-Hand) for Sale.

BOILERS AND EXHAUSTER. Sutton Gas Company.
COAL ELEVATING AND STORING PLANT. Wenham, Cannon Street, E.C.
GASHOLDER AND TANK, STATION METER, CAST-IRON AND STEEL MAINS, SYPHONS, PIG LEAD. Kildwick Gas-Works.
METER (200-LIGHT). Leatherhead Gas Company.
STATION METER. Kilbarchan Gas Company.
STATION METER. Redditch Gas Company.
STREET LANTERNS. Malton Gas Company.
WROUGHT-IRON TANK. Baker's, Scarborough.

Patent Wanted. Incandescent Gas Lighting. No. 4561.

Plant (Second-Hand) Wanted.

STATION GOVERNOR (6-INCH). Cefn Mawr Gas Works.

Stocks and Shares.

ALLIANCE AND DUBLIN GAS COMPANY. March 6.
BEXHILL WATER AND GAS COMPANY. March 12.
BRIXHAM GAS COMPANY. Feb. 24.
CEARÁ GAS COMPANY. March 6.
HORNSEY GAS COMPANY. March 6.
SUNDERLAND AND SOUTH SHIELDS WATER COMPANY. Feb. 22.
YORK GASLIGHT COMPANY. March 13.

TENDERS FOR

Boilers.

LEICESTER GAS DEPARTMENT. Tenders by Feb. 28.
MARKET HARBOROUGH GAS DEPARTMENT. Tenders by Feb. 24.

Exhauster and Engine.

HALIFAX GAS DEPARTMENT. Tenders by Feb. 28.

General Stores, Ironmongery, Oil, Paint, &c.

BRIGHOUSE CORPORATION. Tenders by March 6.
STOCKTON-ON-TEES CORPORATION. Tenders by Feb. 16.

Oil for Gas Making.

CARLISLE GAS DEPARTMENT. Tenders by March 5.

Oxide of Iron.

CARLISLE GAS DEPARTMENT. Tenders by March 5.

Pipes, &c.

BRIGHOUSE CORPORATION. Tenders by March 6.

Steel Roof, &c.

SHEFFIELD GASLIGHT COMPANY. Tenders by March 6.

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CARLISLE GAS DEPARTMENT. Tenders by March 5.
DARENTH ASYLUM. Tenders by March 5.

Valves.

WARRINGTON GAS DEPARTMENT. Tenders by March 1

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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by 4 feet, complete with Fittings. Now working. Also EXHAUSTER, 10,000 cubic feet per hour.
Full Particulars from the SECRETARY, Sutton Gas Company, Sutton, SURREY.

FOR SALE, Station Meter. Capacity,
2400 cubic feet per hour, 4-inch Connections and Valves; Also GAS-GOVERNOR, 6-inch Connections. To be seen at Kilbarchan Gas-Works.
Particulars from the MANAGER.

REDDITCH GAS COMPANY.
STATION Meter for Sale. Handsome
design. Perfect Condition. Capacity, 11,200 feet per hour. Cheap to immediate purchaser.
ALBERT E. LAYTON,
Manager.

GAS PLANT for Sale—I can always offer
NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

COAL ELEVATING AND STORAGE PLANT.
THE Liquidator of the Electric Turbine
Gas-Retort Charging and Discharging Machine Company, Limited, offers FOR SALE the following Plant (by Graham, Morton, & Co., Limited), now at Beckton Gas-Works—viz., Coal Elevating and Storage Plant, including One Wrought-Iron Jigger Feeder and 4-Roll Crusher, with 20-inch Elevator. No reasonable Offer refused.
Offers should be made to the LIQUIDATOR, Mr. W. K. Wenham, 27, Martin's Lane, CANNON STREET, E.C.

FOR SALE, cheap, the undermentioned—
Four PURIFIERS, 10 ft. by 10 ft. by 4 ft. 6 in. deep, complete.
Two ditto, 10 ft. by 10 ft. by 4 ft. 6 in. deep, complete.
Two ditto, 10 ft. by 5 ft. by 4 ft. deep, complete.
One Cast-Iron SCRUBBER, 12 ft. high by 6 ft. dia.
One ditto 4-inch VERTICAL CONDENSER.
A quantity of good GAS-VALVES, all sizes, from 4-inch to 24-inch diameter.
Inquiries Invited for any other Gas Plant.
Apply to SAML. WHILE & SON, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE—
GASHOLDER and Cast-Iron TANK, Diameter 42 feet, Capacity 33,000 cubic feet.
6-inch STATION METER.
420 10-inch Cast-Iron MAINS, 9 feet lengths.
Four 10-inch SYPHONS.
One 10-inch Steel MAIN, 21 feet long.
200 6-inch Cast-Iron MAINS.
90 5-inch ditto.
LEAD (in Pigs), 30 cwt.
Tenders are invited for the whole or any portion of the above, to be sent in on or before March 3, 1906, to F. H. PICKLES, Gas-Works, KILDWICK.

WROUGHT-IRON Rectangular Tank,
11 ft. by 5 ft. 3 in. by 4 ft., made of Boiler Plates, with bolted-on Cover, two Manholes, suitable for hot well or similar purpose. Equal to new; cheap.
Apply, BAKER'S, Melrose Street, SCARBOROUGH.

BOOKS on Gas for Sale.—Sugg's Gas
Manipulation; Matthew's History of Gas Lighting; F. W. Hartley's Gas Analyst's Manual; F. W. Hartley's Gas Measurement; F. W. Hartley's Estimation of Ammonia and Sulphur; Paterson's Lithology of Gas Coal; Gas Purification, by R. H. Patterson; Dibdin's Practical Photometry; Stevenson's Modern Appliances in Gas Manufacture; The Gas Manager in the Laboratory; Reports of Gas Institute, 1870-1904; Reports of Gas Managers' Meetings, 1883-1900. Inquiry Solicited.
Address No. 4538, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS TAR.
FOR SALE, at Darenth Asylum, Dart-
ford, Kent (under the Metropolitan Asylums Board), during the Twelve Months ending Lady-day, 1907, a quantity of GAS TAR, estimated at about 450 Barrels.
The Asylum is Three miles from Dartford, where the Tar can be conveyed by barge or rail in consignments of about 150 Barrels at a time.
Barrels not provided.
Tenders, to state price per Barrel of 40 Gallons, at the Asylum, to be endorsed on the envelope "Tenders for Gas Tar, Darenth Asylum," and to be delivered at the Office of the Board, Embankment, London, E.C., not later than Ten a.m. on Monday, March 5.
Feb. 8, 1906.

BOROUGH OF BRIGHOUSE.
THE Town Council are prepared to re-
ceive TENDERS for the supply of the following STORES—viz., IRONMONGERY, OIL, PAINTS, &c., WROUGHT-IRON TUBES and FITTINGS, and BRUSHES required by the Gas Committee during the Year ending March 31, 1907.
Specification and Form of Tender can be obtained on application at the Gas Engineer's Office, Mill Lane Works, Brighouse.
Sealed Tenders are to be sent in on or before Tuesday, the 6th day of March, 1906, addressed to the Town Clerk, Municipal Offices, Brighouse.
The lowest or any Tender not necessarily accepted.
By order,
JAMES PARKINSON,
Town Clerk.
Municipal Offices, Brighouse,
Feb. 16, 1906.

TO ROOF CONTRACTORS.
THE Directors of the Sheffield United
Gaslight Company invite TENDERS for the Supply and Erection, at their Neepsend Station, of a STEEL ROOF, 263 feet long by about 57 feet span, together with the RAISING of the Two existing Side Spans, one of which is 263 feet long by 19 ft. 10 in., and the other 145 feet long by 19 ft. 6 in.; the whole forming part of the Roof over the No. 2 Retort-House.
Drawings may be seen, and Bill of Quantities with Specification and Form of Tender obtained, upon application to the Company's Engineer, Mr. John W. Morrison, Commercial Street, on and after Monday, Feb. 19.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Tender for Roof," must be delivered by post to the undersigned not later than the first post on Tuesday, the 6th day of March.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Feb. 14, 1906.

CORPORATION OF LEICESTER.
LANCASHIRE BOILERS.
THE Gas and Electric Lighting Com-
mittee of the above Corporation are prepared to receive TENDERS for the Supply and Erection, on Foundations provided, of Three LANCASHIRE BOILERS, 30 feet by 8 ft. 6 in., at their Aylestone Road Works.
Specification and Form of Tender may be obtained on application to the Engineer, and on payment of the sum of £5, which amount will be returned upon receipt of a *bonâ-fide* Tender.
Tenders, addressed to Mr. Councillor Edwards, Chairman, and endorsed "Tender for Boilers," to be delivered at these Offices not later than Eleven o'clock a.m. on Wednesday, Feb. 28, 1906.
The Committee do not bind themselves to accept the lowest or any Tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane,
Leicester, Feb. 14, 1906.

BOROUGH OF STOCKTON-ON-TEES.
ANNUAL SUPPLIES.
THE District Fund, Gas, and Electricity
Committees of the Stockton-on-Tees Corporation invite TENDERS for the several ARTICLES and STORES required by them for the Year ending March 31, 1907.
Forms of Tender, Conditions of Contract, and all Information, may be obtained of the Borough Surveyor, Gas Manager, and Electrical Engineer.
Persons desirous of Tendering should state the Articles they desire to Offer.
Tenders, endorsed "Stores," and also marked for the particular Committee for which they are intended, on printed Forms only, to be delivered to me not later than the 16th of February, 1906.
The lowest or any Tender not necessarily accepted, and no guarantee will be given as to quantity required.
By order,
ARTHUR B. CROSBY,
Town Clerk.
Stockton-on-Tees,
February, 1906.

CITY OF CARLISLE.

TENDERS FOR PURCHASE OF TAR.

THE Gas Committee are prepared to receive TENDERS for the Purchase of the surplus COAL and WATER-GAS TAR to be produced at their Works for a period of One Year from the 1st of April next.

Tenders, endorsed "Tar," and addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Town Clerk not later than Monday, March 5, 1906.

Further Particulars may be had on application to the undersigned.

The Committee do not bind themselves to accept the highest or any Tender.

W. J. SMITH, B.Sc.,
Engineer and Manager.

Gas-Works, Carlisle,
Feb. 14, 1906.

CITY OF CARLISLE.

TENDERS FOR OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply to their Works of about 200 Tons of OXIDE OF IRON, delivery to be made over a period of One Year from April 1 next.

Tenders, endorsed "Oxide of Iron," to be addressed to the Chairman of the Gas Committee, and delivered at the Office of the Town Clerk not later than Monday, March 5, 1906.

Further Information may be had on application to the undersigned.

No pledge is given for the acceptance of the lowest or any Tender.

W. J. SMITH, B.Sc.,
Engineer and Manager.

Gas-Works, Carlisle,
Feb. 14, 1906.

CITY OF CARLISLE.

TENDERS FOR GAS OIL.

THE Gas Committee are prepared to receive TENDERS for the supply of 1100 to 1200 Tons of GAS OIL, for the manufacture of Carburetted Water Gas, during a period of One, Two, or Three Years, at the option of the Contractor, from April 1 next.

Tenders, endorsed "Gas Oil," and addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Town Clerk not later than Monday, March 5, 1906.

Forms of Tender and other Particulars may be had on application to the undersigned.

The lowest or any Tender will not necessarily be accepted.

W. J. SMITH, B.Sc.,
Engineer and Manager.

Gas-Works, Carlisle,
Feb. 14, 1906.

COUNTY BOROUGH OF WARRINGTON.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of various VALVES.

Further Particulars can be obtained on application to Mr. W. S. Haddock, Engineer, Gas-Works, Warrington.

Sealed Tenders, endorsed "Tenders for Valves," addressed the Chairman, Gas Committee, Gas Offices, Warrington, must be sent in not later than Thursday, March 1 next.

FREDK. TAYLOR,
Secretary.

Gas Offices, Warrington,
Feb. 19, 1906.

MARKET HARBOROUGH URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply and Erection, on Foundations provided, of One CORNISH BOILER, 18 ft. by 6 ft., at the Gas-Works, Market Harborough.

Specification and Form of Tender may be obtained from the undersigned on payment of £3 3s., which amount will be returned upon receipt of a *bonâ-fide* Tender.

Tenders, addressed to the undersigned, endorsed "Tender for Boiler," to be delivered at these Offices not later than Saturday, the 24th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED T. HARRIS,
Manager and Secretary.

Gas Offices, St. Mary's Road,
Market Harborough, Feb. 7, 1906.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation invite TENDERS for the Supply and Erection of a ROTARY EXHAUSTER and HORIZONTAL ENGINE; the Exhauster to be capable of dealing with 150,000 cubic feet of Gas per hour.

Full Particulars may be obtained on application to Mr. John Wilkinson, F.C.S., Engineer, Gas-Works, Halifax.

Sealed Tenders, endorsed "Engine and Exhauster," must be sent to the undersigned not later than Ten o'clock a.m. on Wednesday, Feb. 28, 1906.

The person whose Tender is accepted will be required to observe the Fair Contracts Clauses adopted by the Corporation.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
KEIGHLEY WALTON,
Town Clerk.

SALE OF £3000 FIVE PER CENT. PREFERENCE SHARES AND £2000 SEVEN PER CENT. ORDINARY SHARES

IN THE

BRIXHAM GAS COMPANY, LIMITED.

MR. S. F. DUGDALL is instructed by the Directors to SELL BY AUCTION, at the Market Hall, Brixham, Devon, on Saturday, the 24th of February, 1906, at Four o'clock precisely, in separate Lots, 300 PREFERENCE SHARES of £10 each, entitling the Holders to a Cumulative Dividend of Five per cent, which will be paid in priority to the dividends on the Ordinary Shares, and 200 ORDINARY SHARES of £10 each, entitling the Holders to a Standard Dividend of Seven per cent., subject to the sliding-scale based on the price of Gas. The Standard Price of Gas is 4s. per 1000 cubic feet. The Company was Established in 1838, and Incorporated in 1904 by special Act of Parliament. The authorized Capital is £20,000, of which the above £5000 remains to be issued.

The sale of Gas in 1903 was 7,619,300 cubic feet.
" " 1904 " 8,903,000 "
" " 1905 " 11,161,800 "
an increase of 2,258,800 cubic feet over the previous year.

The New Capital is required to pay for the extensions to the Works, which have been nearly completed, and which were necessitated by the rapid growth of the demand for Gas in the District. It will be issued *free of expense* to Purchasers.

Detailed Particulars of Sale, with Form of Instructions to Purchase, obtainable, post free, from the OFFICES OF THE COMPANY, in Fore Street, BRIXHAM, and 50, Cannon Street, LONDON, E.C., or of the AUCTIONEER, Brixham, DEVON.

BEXHILL WATER AND GAS COMPANY.

SALE BY TENDER OF ORDINARY SHARES.

THE Directors Give Notice that they will be prepared to receive, not later than Twelve o'clock at noon on Monday, the 12th day of March, 1906, sealed TENDERS for 1500 ORDINARY SHARES of £10 each, being a further portion of the Additional Capital the creation and issue of which was authorized under the powers of the Bexhill Water and Gas Order, 1901, by Resolution of the Extraordinary Meeting of the Shareholders of the Company held on the 30th day of January, 1902.

This Capital is required for payment of Contracts which have been entered into for carrying out the Extension Works authorized by the Company's Act of 1904.

The Shares will rank with the existing Ordinary Shares for a maximum dividend of Seven per cent.

The minimum price below which no Tender will be accepted has been fixed at £10 10s. per share.

In the event of the receipt of Tenders at the lowest Price accepted for a larger number of Shares than those proposed to be issued, such Tenders will be subject to a *pro rata* diminution.

Every purchaser will be required, on notice being given of the acceptance of his Tender, forthwith to pay to the Company the full price of the Shares sold to him, including any premium; and if from any cause whatever such price shall not be paid on or before the 21st day of March next, interest at 10 per cent. shall be paid thereon from that date until payment.

The registered holders of the Shares now sold will be entitled to dividend from the date of payment for same.

Forms of Tender can be obtained personally or by letter from the Offices of the Company.

By order of the Board of Directors,
ROBT. DOUGLAS JESTY,
Secretary.

Offices of the Company:
5, Sea Road, Bexhill-on-Sea.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

NEW ISSUE OF 2500 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 6, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS STOCKS AND SHARES

IN THE

HORNSEY GAS COMPANY.

£440 CONSOLIDATED STOCK and £400 FIVE PER CENT. PREFERENCE STOCK.

CEARA GAS COMPANY, LIMITED.

100 £10 ORIGINAL SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 6, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE OF WATER STOCK.

TO BE SOLD by Auction, in the Long Room of the Queen's Hotel, Fawcett Street, Sunderland, on Thursday, Feb. 22, 1906, at Two o'clock in the Afternoon prompt,

MR. ATKINSON GIBSON, AUCTIONEER,

£20,000

(Nominal) of Additional ORDINARY CAPITAL STOCK (Maximum Dividend Five per cent.) authorized to be created and issued under the powers contained in the Sunderland and South Shields Water Act, 1891.

The above Stock will be entitled to Dividend from the 1st day of January, 1906, and be registered in the name of the Purchaser free of charge.

A deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 1st day of March, 1906.

THE YORK UNITED GASLIGHT COMPANY.

SALE BY TENDER OF DEBENTURE STOCK,

under the provisions of the York United Gaslight Company's Act, 1898.

MINIMUM PRICE, £100 PER CENT.

NOTICE is Hereby Given, that in pur- suance of a Resolution passed at a Meeting of the Company specially convened for the purpose, and held on the 1st day of February, 1906, it is the intention of the Company to SELL BY TENDER £35,000 REDEEMABLE DEBENTURE STOCK, entitled to a fixed preferential interest of £3 15s. per centum per annum, and to be paid up in full on or before the 20th day of March, 1906, and all such Stock may be redeemed by the Company at par on the 1st day of January, 1926.

Particulars and Conditions of Tender may be obtained on application at the Gas Company's Offices, Davygate, York, or at the York City and County Bank, or any of its Branches, and sealed Tenders, marked "Tender for York Gas Stock," must be lodged with the Gas Company, Davygate, York, not later than Ten o'clock a.m. on Tuesday, the 13th day of March, 1906.

By order,
MATTHEW LEAF,
Secretary.

Gas Offices, Davygate,
York, Feb. 13, 1906.

MODERN METHODS OF SAVING LABOUR IN GAS-WORKS

(WITH SIXTY ILLUSTRATIONS),

By C. E. BRACKENBURY, Assoc.M.Inst.C.E.

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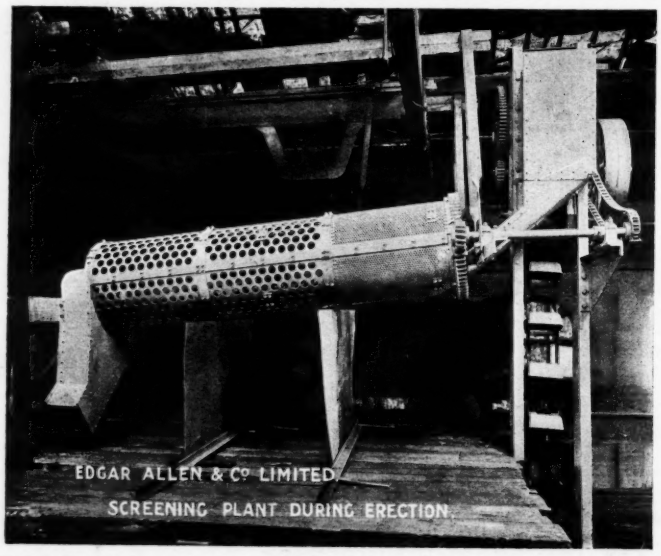

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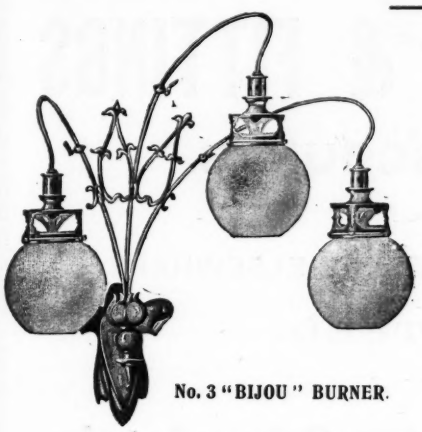

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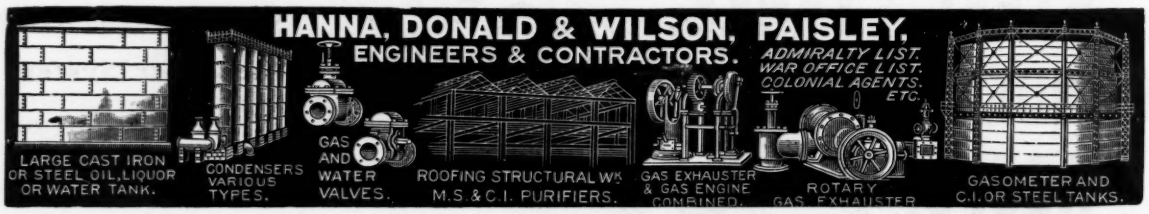

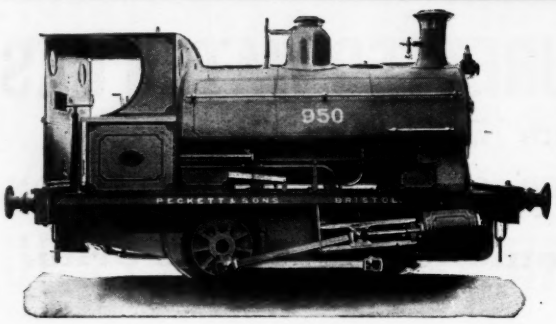

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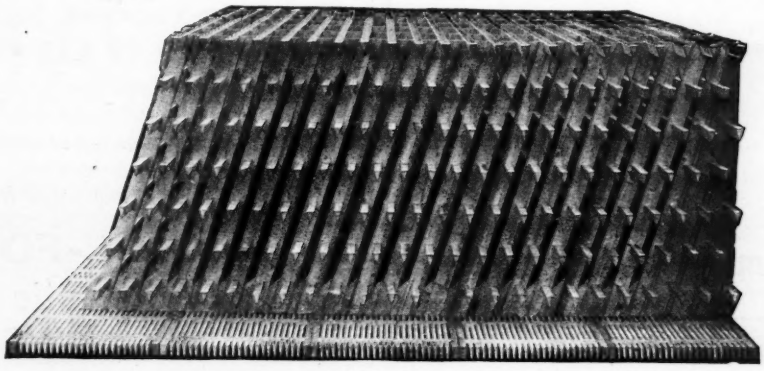

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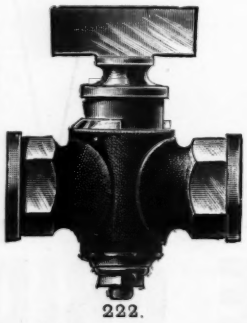

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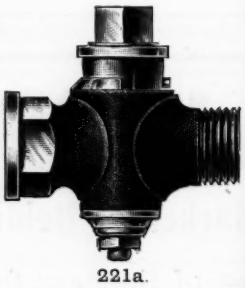

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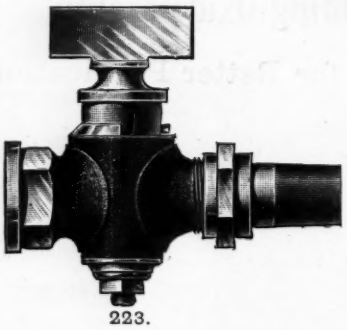

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Fig. 35. 100 c.p.

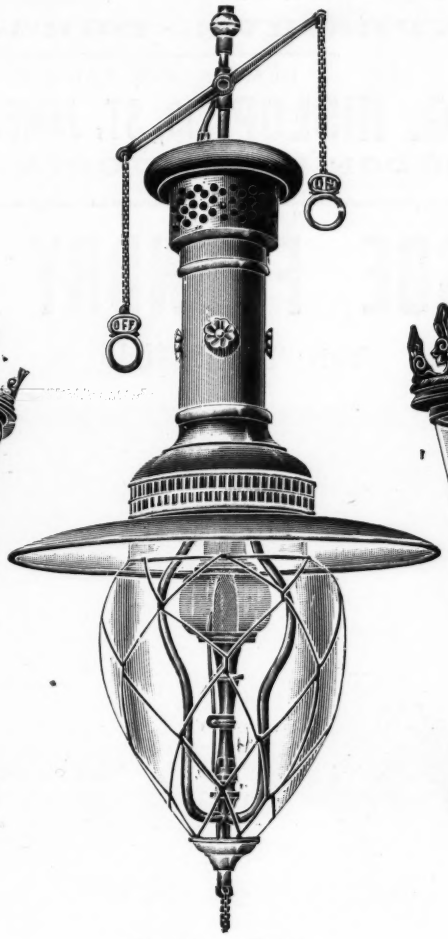

Fig. 607. 600 c.p.
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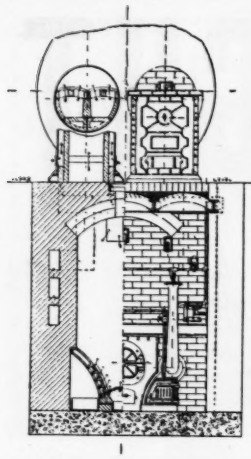

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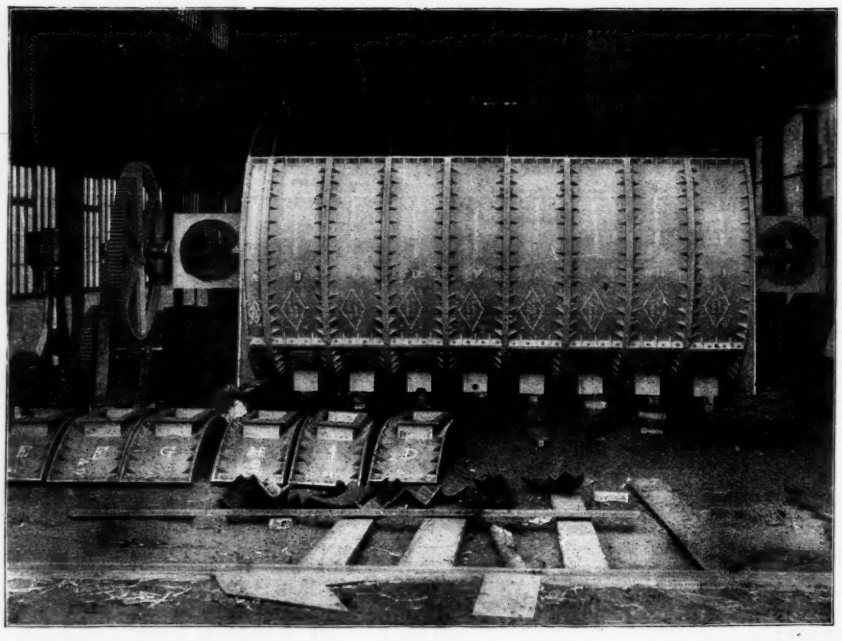

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Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

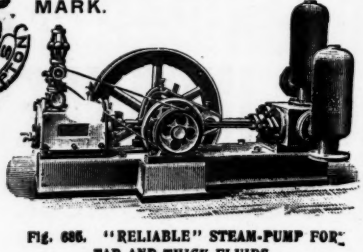

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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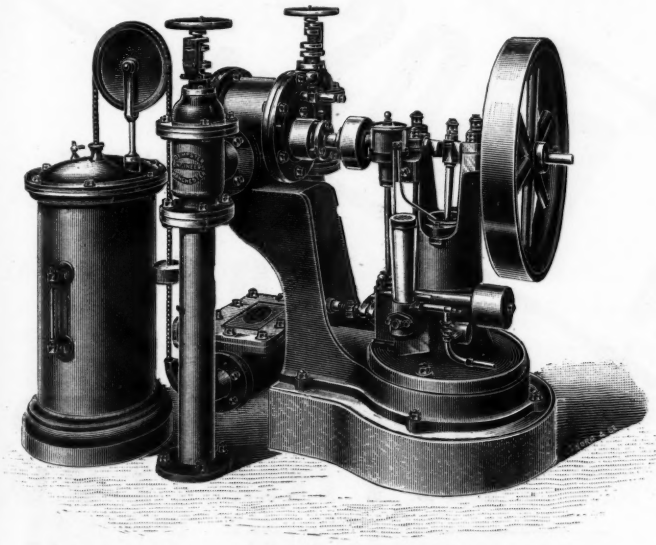

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